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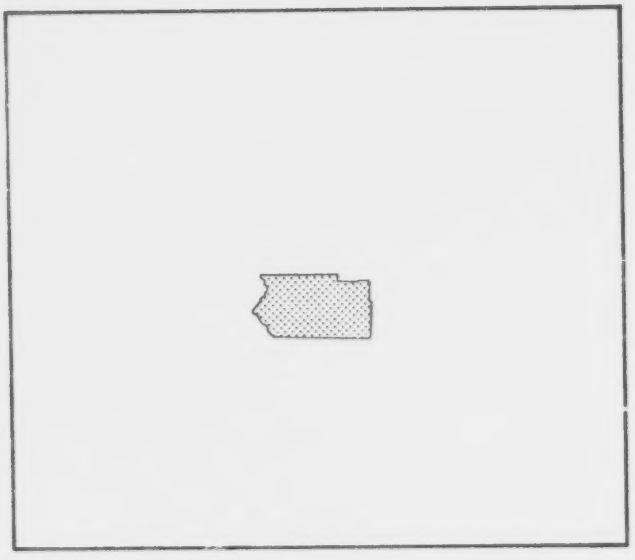
FEMA-209-080067

FLOOD INSURANCE STUDY

FREMONT COUNTY, COLORADO
UNINCORPORATED AREAS



SEPTEMBER 29,1989

Federal Emergency Management Agency

COMMUNITY NUMBER - 080067

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. Please contact the community repository for any additional information.

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FLOOD INSURANCE STUDY
FREMONT COUNTY, COLORADO (UNINCORPORATED AREAS)

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) investigates the existence and severity of flood hazards in the unincorporated areas of Fremont County, Colorado, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This FIS study will be used to establish actuarial flood insurance rates and assist in the community in their efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

This FIS was prepared by compiling pertinent information for the flood hazard areas in the unincorporated areas of Fremont County from existing technical and/or scientific data originally prepared by others for purposes other than the NFIP. The existing data were reviewed by the Federal Emergency Management Agency (FEMA) prior to its use in the development of this FIS to ensure compliance with NFIP regulations.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these Federally-supported studies are based. In such cases, the more restrictive criteria take precedence; and the State (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this FIS are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses used to prepare this FIS were performed by the U.S. Army Corps of Engineers (COE), Albuquerque District in 1978 (Reference 1), Great Divide Engineering & Surveying in October 1981 (Reference 2), and Camp Dresser & McKee, Inc., in June 1982 (Reference 3) when preparing Flood Plain Information Reports for the area.

1.3 Coordination

On December 13, 1988, the results of this study were reviewed and accepted at a final coordination meeting attended by representatives of the community and FEMA.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the unincorporated areas of Fremont County, Colorado. The area of study is shown on the Vicinity Map (Figure 1).

The areas studied by detailed methods were selected based upon the extent and validity of available existing hydrologic and hydraulic data.

The following streams were studied by detailed methods throughout the unincorporated areas of Fremont County:

Arkansas River: from a point approximately 1,000 feet downstream of Colorado State Highway 115 upstream to the Canon City Corporate Limits, a point approximately 3,720 feet upstream of Raynold's Avenue, a reach of approximately 9.8 miles.

Oak Creek: from its mouth to a point approximately 925 feet upstream of the Atchison Topeka and Santa Fe Railroad, a total study reach of approximately 1.6 miles.

Coal Creek: from its mouth upstream to the northern corporate limits and continuing from the southern corporate limits to a point approximately 5,630 upstream of the Denver and Rio Grande Western Railroad Bridge, a total study reach of approximately 0.73 mile.

Northeast (NE) Canon Drainage Area: The west branch was studied from the northern corporate limits, approximately 965 feet downstream of Fruitland Ditch, upstream to a point approximately 3,260 feet upstream of Washington Avenue in Canon City, a reach of approximately 0.67 mile; the east branch was studied from the northern corporate limits at Central Avenue in Canon City upstream to a point approximately 4,300 feet upstream of Tennessee Avenue, a reach of approximately 2.2 miles.

Chandler Creek: from its mouth upstream to a point approximately 1,560 feet upstream of Fremont County Road 11A, a reach of 2.36 miles.

2.2 Community Description

Fremont County is located in south-central Colorado in the foothills of the Rockies, 45 minutes southwest of the City of Colorado Springs and 39 miles west of the City of Pueblo. The county is bordered by Teller and Park Counties to the north, Chaffee County to the west, Saguache, Custer, and Pueblo Counties to the south, and Pueblo and El Paso Counties to the east. The Town of Brookside, City of Canon City, Town of Coal Creek, City of Florence, Town of Prospect Heights, Town of Rockville, and Town of Williamsburg are located in Fremont County. Canon City is the

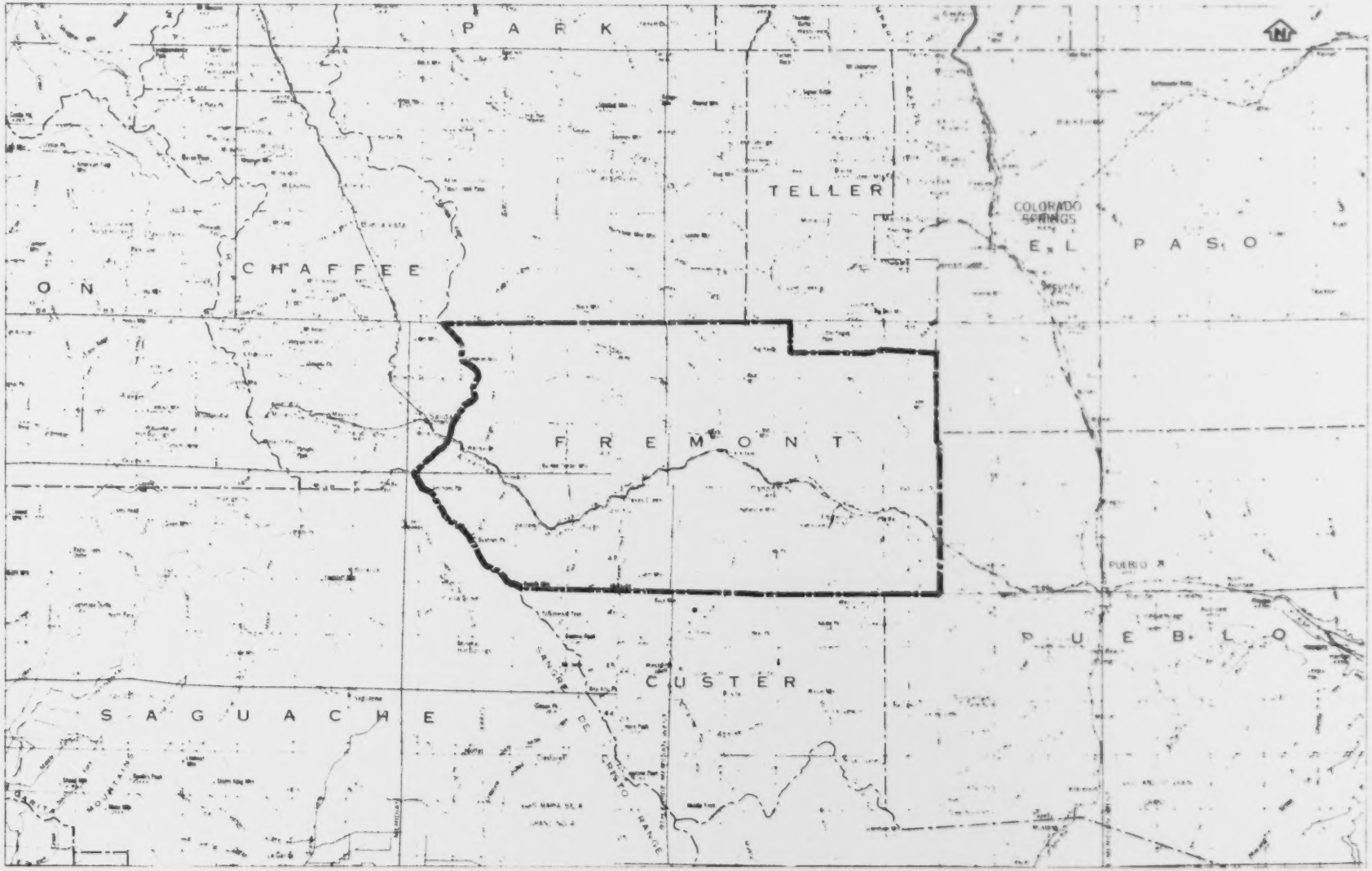

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

FREMONT COUNTY, CO
(UNINCORPORATED AREAS)

APPROXIMATE SCALE

16 0 16 32 48 MILES

VICINITY MAP

county seat. U.S. Highway 50 runs through the center of the county.

One of the longest rivers in the U.S., the Arkansas River, rises in the central Colorado Rockies near Leadville, Colorado, and empties into the Mississippi River southeast of Pine Bluff, Arkansas. The Arkansas River Basin above Canon City is characterized by high mountain valleys surrounded on three sides by mountains reaching altitudes of more than 14,000 feet. The basin is surrounded by mountain ranges that act as orographic barriers to major storm systems. Below Canon City the valley opens up into a wide river valley with less orographic barriers (Reference 3).

In the past the Ute, Sioux, Cheyenne, Kiowa, Blackfoot, and Commanche Indians all frequented the area. Many wintered at the mouth of the Royal Gorge, an area just west of the Territorial Prison on the west side of Canon City, taking advantage of the favorable climate. Even today the climate is relatively mild; the average winter high temperature is 54°F and the low is 29°F; the average summer high temperature is 77°F and the low is 50°F. The average rainfall is approximately 14 inches, while average snowfall is approximately 15 inches (Reference 4).

The area was first claimed as Spanish Territory and the area north of the Arkansas River was purchased from France as part of the Louisiana Purchase. Mexico, having gained independence in 1821, claimed the area, thus becoming the third foreign country to lay claim to the area. The United States then annexed the area in 1845.

The first territorial prison, still the area's largest employer, employing a total of 800 persons, opened on June 1, 1871.

Above Canon City the basin topography is typical mountain terrain with characteristic alpine vegetation. Below Canon City the basin topography is much like that of the lower foothills and plains area. Vegetation is sparse within the basin, more so in the upper reaches, but willow, boxelder and wild fruit trees have grown along the banks of the drainage swales, especially in the lower areas of the basin.

A prominent tourist attraction in the area is the Royal Gorge, considered one of Colorado's most magnificent and breathtaking sights. The narrow gorge, 1,055 feet deep, is spanned by the world's highest bridge. An aerial tram glides across this spectacular chasm, and the world's steepest incline railway travels to the bottom of the gorge (Reference 4).

According to the 1980 U.S. Census, the population of Fremont County has increased from 20,196 in 1960 to 28,676 in 1980 (Reference 5).

2.3 Principal Flood Problems

Floods in the study area are usually caused by general rainstorms, and cloudburst storms occur from May through September. During this period, warm, moist air masses from the Gulf of Mexico combine with cold and comparatively dry air from the polar regions to cause thunderstorms. Floods resulting from prolonged heavy rainfall over the watershed are characterized by moderate volume and duration. The cloudburst type is a high-intensity, short-duration rainstorm which produces a flood of high peak flow, short duration and small volume of runoff.

Flood potential also exists from rapid melting of heavy snow cover in late spring and summer. Floodflows resulting from snowmelt are characterized by moderate peaks, large volume and long duration. Arkansas River peak flow from snowmelt occurs in June and July. This peak flow in combination with rainfall can cause severe flooding.

Detailed information on floods before the turn of the century is very limited. Information on past flooding is based on newspaper accounts and interviews with long-time residents of the area. Large floods have occurred in 1909, 1921, 1932, 1941, 1948, 1949, and 1965. These floods have caused major damage, disrupting highway and railroad traffic and communication services, drowning livestock, and destroying agricultural lands, roads, bridges, and buildings. Several persons have lost their lives and others have been injured (Reference 6).

The flood of June 1921 is considered the most severe flood known in the area. Peak discharges have been estimated by the U.S. Geological Survey (USGS) at 2,760 cubic feet per second (cfs) for Oak Creek and 3,720 cfs for Coal Creek. Floods in 1909 and 1932 were characterized by high-intensity cloudbursts, while the floods in 1941, 1948, 1949, and 1965 were caused by high-intensity cloudbursts coupled with hail-choked runoff channels.

2.4 Flood Protection Measures

There are very few existing flood control structures in the study area that could reduce any flood hazards. In the 1930's, Coal Creek, in and around the Town of Florence, was lined with concrete slabs, grouted in place to form a concrete slopewall lining both sides of the creek. This slopewall was capped with a 3-foot floodwall. This channel through the Town of Florence, however, is capable of conveying only the minor flood volumes through the town without exceeding the capacity of the channel and bridge structures over the channel.

Various agencies have performed minor channel cleaning and riprapping along Coal and Oak Creeks, but no extensive flood control work has been performed since the 1930's.

In 1974, congressional authorization was given to the COE to investigate the feasibility of certain flood protection measures for Oak, Coal, and Chandler Creeks in Fremont County, Colorado. Preliminary investigations carried out by the COE have included site investigations, hydrologic studies, and hydraulic analyses of each of these three flooding sources. Specifically, the project proposals include flood control dams on Coal and Oak Creeks and a diversion dam on Chandler Creek. None of these flood control measures were considered in the hydrologic and hydraulic analyses conducted herein; however, if these measures were achieved, they would greatly reduce, and in most cases eliminate, flood hazards from storms of frequencies as low as the 500-year recurrence interval.

3.0 ENGINEERING METHODS

For the flooding sources studied by detailed methods in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, and 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1-percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). For the Arkansas River and Chandler, Oak, and Coal Creeks, the 10-, 50-, 100-, and 500-year recurrence interval floods were considered, while for the NE Canyon Drainage area only the 100-year recurrence interval flood was considered. The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were completed to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for the Arkansas River. A regional relationship of basin area to peak discharge was used for the Arkansas River. Gaging stations located within the upper Arkansas basin were used to determine the floodflow-frequency relationship based on a log-Pearson Type III distribution for each selected gaging station.

The annual peak discharges were obtained from USGS Water-Supply Paper Nos. 1681, 1921, and 2121 (References 8, 9, and 10, respectively) and from Water Resources Data for Colorado (Reference 11). Regional relationships of basin area to peak discharge were determined for the 10-, 50-, 100-, and 500-year floods (Reference 3). Previously, the COE, Albuquerque District, computed frequency-discharge curves from gage station analyses of the USGS gages on the Arkansas River at Pueblo and Canon City (Reference 1). An area proportion was then applied between the Pueblo and Canon City station results to obtain peak flows in Fremont County. The discharges obtained in the previous calculations fell within the 90 percent confidence limits of the COE Canon City gage-station-analyses discharges; therefore, the hydrologic analyses performed by the COE are considered valid.

There are no streamflow records for the NE Canon drainage basin. Peak discharge for the 100-year frequency flood were therefore developed using the synthetic rainfall-runoff evaluation procedures (Reference 12). Synthetic runoff hydrographs were developed from the U.S. Soil Conservation Service Triangular Hydrograph Equation using incremental hydrographs. All runoff computations were based on existing land use and cover conditions in the watershed as of March 1980. Precipitation data were taken from NOAA Atlas #2, Precipitation-Frequency Atlas of the Western United States, Volume III, Colorado (Reference 13).

Peak discharge-drainage area relationships for Arkansas River, Oak, Coal, and Chandler Creeks, and NE Canon Drainage Area are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (Sq Miles)	PEAK DISCHARGE (cubic feet per second) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
Arkansas River					
Upstream of Florence,					
at Minnequa Dam	3,546	11,000	21,000	28,000	71,000
at Canon City	3,117	8,850	16,500	20,500	32,500
Oak Creek at mouth	50.62	10,500	17,000	20,500	37,000
Coal Creek at mouth	20.40	4,900	7,800	9,000	15,000
NE Canon Drainage Area					
North of Kountz Ave	5.53	--1	--1	2,380	--1
North of Central	4.75	--1	--1	1,660	--1
South of South St.	3.17	--1	--1	1,450	--1
South of High St.	2.68	--1	--1	1,050	--1
North of High St. (Sub-basin from NW)	1.67	--1	--1	630	--1
North of Harding	1.58	--1	--1	850	--1
North of High St. (Sub-basin from NE)	1.01	--1	--1	926	--1
Chandler Creek at mouth	13.95	6,200	8,200	12,500	20,000

--1 Not Computed

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the riverine sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Analyses of the hydraulic characteristics of the Arkansas River study reach were carried out by Camp Dresser & McKee, while Great Divide Engineering & Surveying completed the analyses of the hydraulic characteristics of the NE Canon Drainage Area, to provide estimates of the water-surface elevations for floods of the selected recurrence intervals. Water-surface profiles were calculated using the COE HEC-2 step-backwater surface profile computer program. Water-surface profiles were computed for the 10-, 50-, 100-, and 500-year floods and are plotted for the Arkansas River in the vicinity of the City of Florence and City of Canon City areas, while water-surface profiles were computed for the 100-year flood and are plotted for the NE Canon Drainage Area.

Cross-sections for the backwater analyses of the various streams were field surveyed at close intervals above and below bridges and culverts in order to compute the significant backwater effects of these structures. Additional digitized cross sections were secured when the topographic maps were compiled.

For the Arkansas River and Chandler, Coal, and Oak Creek, divided flow analysis was used on the railroad bridges and other bridges to proportion the flow between the channel and the overbanks of streams. Additional cross sections were obtained and computations made to define the separated flow characteristics of the overbank flow paths. Backwater computations, using HEC-2, were made for each independent flow path using a random range of discharges. At the point of flow separation, rating curves were constructed using backwater results and added to obtain a composite rating. Flows for each frequency were proportioned for each flow path by reference to the rating curves. From the computations, the probable flow direction was determined and equal potential water-surface contours were projected into adjacent ponding or low velocity areas. The constrictions that produce the divided flow also limit the quantities of flow in the channels downstream. The flow regulation imposed by these structures limit the discharge in the downstream channel to one maximum value for all frequency floods, as reflected in the profiles for these areas (Reference 1).

Locations of selected cross sections in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1).

Channel roughness coefficients (Manning's "n") for these computations were assigned on the basis of field inspection of the floodplain area with ground level photography used as an aid in the selection of the roughness factors and aerial photography used to determine the limits of each roughness zone. For the Arkansas River and tributaries studied the roughness coefficient for the channel was 0.03, while the value ranged from 0.025 to 0.065 for the overbank areas (Reference 3). For the NE Canon Drainage Area that was studied, the roughness coefficients ranged from 0.035 to 0.065 (Reference 2).

Starting water-surface elevations for the Arkansas River were determined by the slope-area method. Starting water-surface elevations for the tributary creeks of Oak, Coal, and Chandler Creeks, and the NE Canon Drainage Area, were determined from a water-surface profile calculation on the Arkansas River using a coincidental flow relationship for the discharge in the Arkansas River (References 1 and 2).

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals.

The hydraulic analyses for this FIS are based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). The elevation reference mark used in this study is shown on the maps; the descriptions of the mark is presented in Elevation Reference Marks (Exhibit 3).

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each FIS includes a floodplain boundary map designed to assist communities in developing sound floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied by detailed methods, the boundaries of the 100-year floodplain boundaries have been delineated using the flood elevations determined at each cross section.

Between cross sections, the boundaries for the NE Canon Drainage Area were interpolated using aerial photography and contour mapping prepared by Ponderosa Engineering, Canon City, Colorado, in partnership with Kucera and Associates, at a scale of 1:2400 with contour intervals of 2 feet (Reference 2). For the Arkansas River, the boundaries between cross sections were interpolated from aerial photography and contour mapping prepared by the COE, Albuquerque District, in conjunction with Sharf & Associates, at a scale of 1:4800, with contour intervals of 2 feet (Reference 1).

For the streams studied by approximate methods, only the 100-year floodplain boundary is shown. Approximate 100-year floodplain boundaries in some portions of the study area were taken directly from the Flood Hazard Boundary Map (Reference 14).

The 100-year floodplain boundaries are shown on the Flood Insurance Rate Map. On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE). Small areas within the floodplain boundaries may lie above the flood elevations, but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 100-year floodplain boundary is shown on the Flood Insurance Rate Map.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced.

Floodways were not determined for this FIS.

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, a flood insurance zone designation is assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the FIS by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the FIS by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 100-year floodplains, and the locations of selected cross sections used in the hydraulic analysis.

7.0 OTHER STUDIES

This FIS was prepared by compiling existing hydrologic and hydraulic data, and utilizing technical and scientific data prepared by other organizations originally for purposes other than the NFIP. The data were identified as the best available at the time of compilation of this FIS and should depict the general conditions of the flooding sources with relative accuracy. FEMA performed a cursory review and accepted the data as valid for purposes of this FIS and the NFIP. However, if better information is known to exist or has been developed since the date of this report, the information should be immediately forwarded to the Chief, Natural and Technological Hazards Division, FEMA, Denver Federal Center, Building 710, Box 25267, Denver, Colorado 80225-0267 regarding revisions of this FIS.

In 1978, the COE prepared a Floodplain Information Report for the Arkansas River Basin at Florence, Colorado (Reference 1). In 1981, Great Divide Engineering and Surveying completed a Floodplain Information Report on Northeast Canon Drainage Area for Canon City, Fremont County, and the Colorado Water Conservation Board (Reference 2). In 1982, Camp Dresser & McKee, Inc., prepared a Floodplain Information Report for the Arkansas River at Florence and Canon City, Colorado. This FIS used the three previous studies as reference sources.

This FIS is in complete agreement with those of the City of Florence and the City of Canon City (References 15 and 16, respectively).

A Flood Hazard Boundary Map has been published for the community (Reference 14). The differences between the Flood Hazard Boundary Map and this FIS are justified due to the more detailed nature of this FIS.

This FIS either supersedes or is compatible with all previous studies published on streams studied in this FIS and should be considered authoritative for the purposes of the NFIP.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this FIS can be obtained by contacting the Chief, Natural and Technological Hazards Division, FEMA, Denver Federal Center, Building 710, Box 25267, Denver, Colorado 80225-0267.

9.0 BIBLIOGRAPHY AND REFERENCES

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14. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Fremont County, Colorado (Unincorporated Area), Scale 1:24,000, August 16, 1974, revised June 27, 1978.

15. Federal Emergency Management Agency, Flood Insurance Study, City of Florence, Colorado, June 4, 1984.

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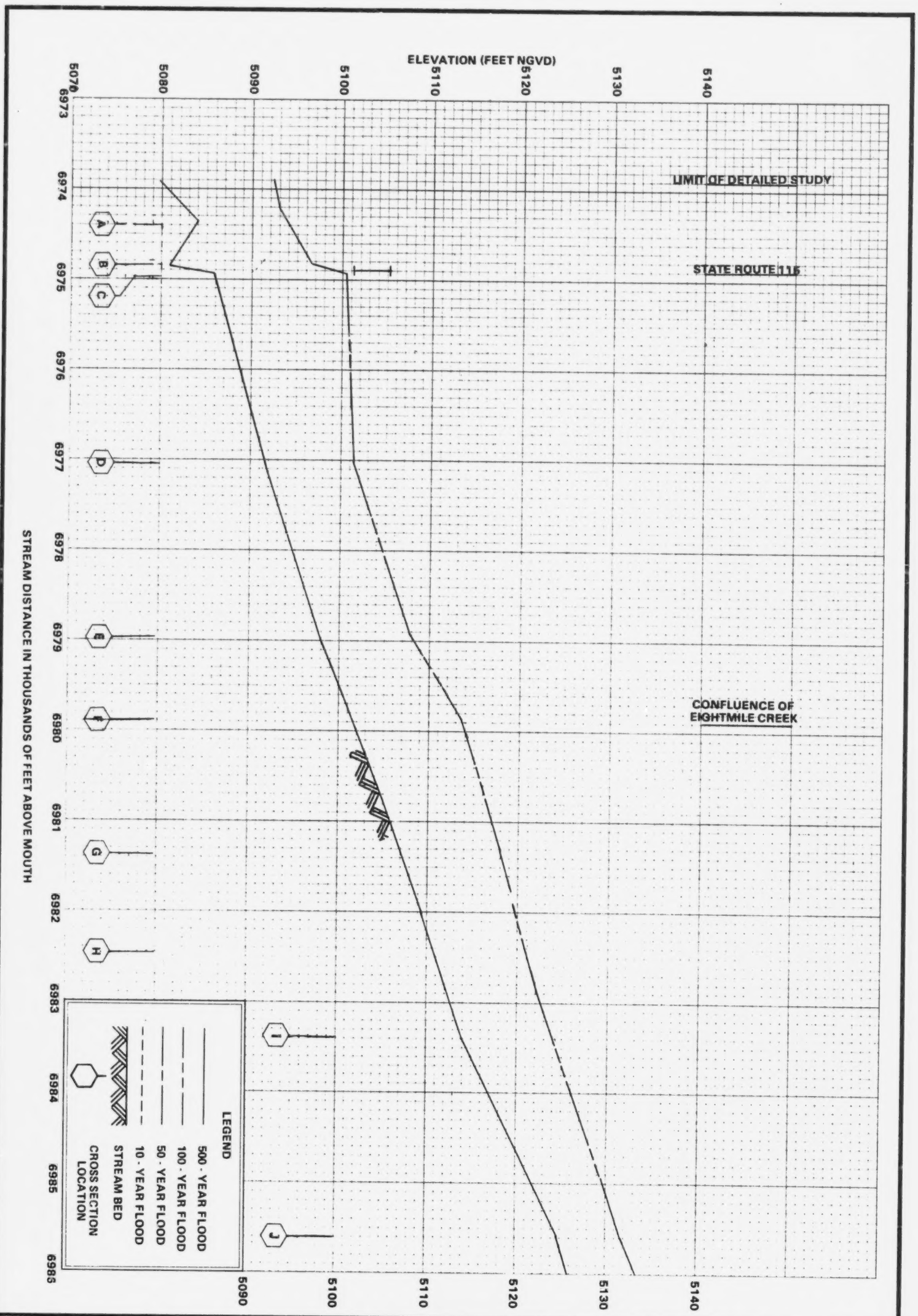


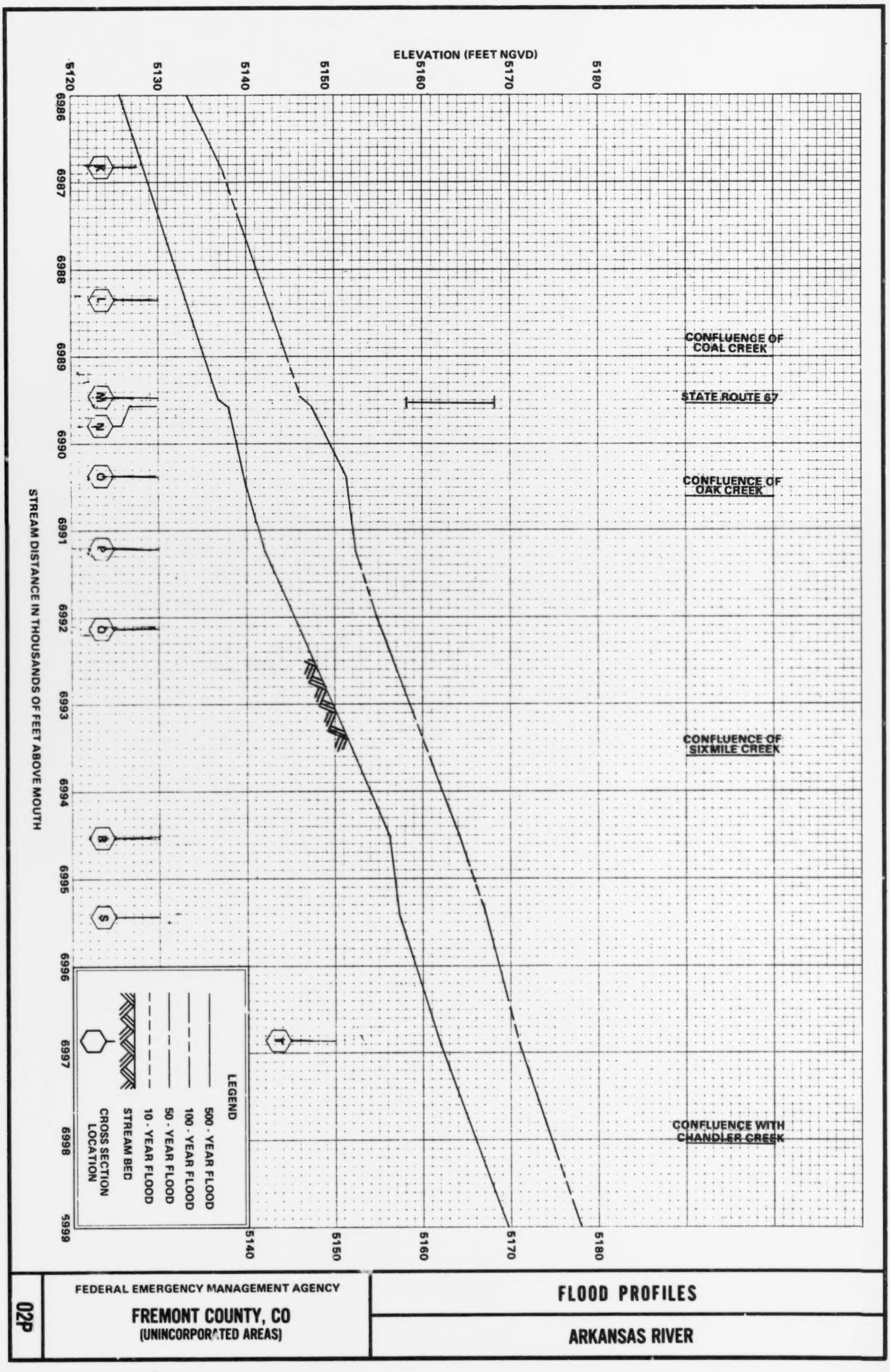
01P

FEDERAL EMERGENCY MANAGEMENT AGENCY

FREMONT COUNTY, CO
(UNINCORPORATED AREAS)

FLOOD PROFILES

ARKANSAS RIVER



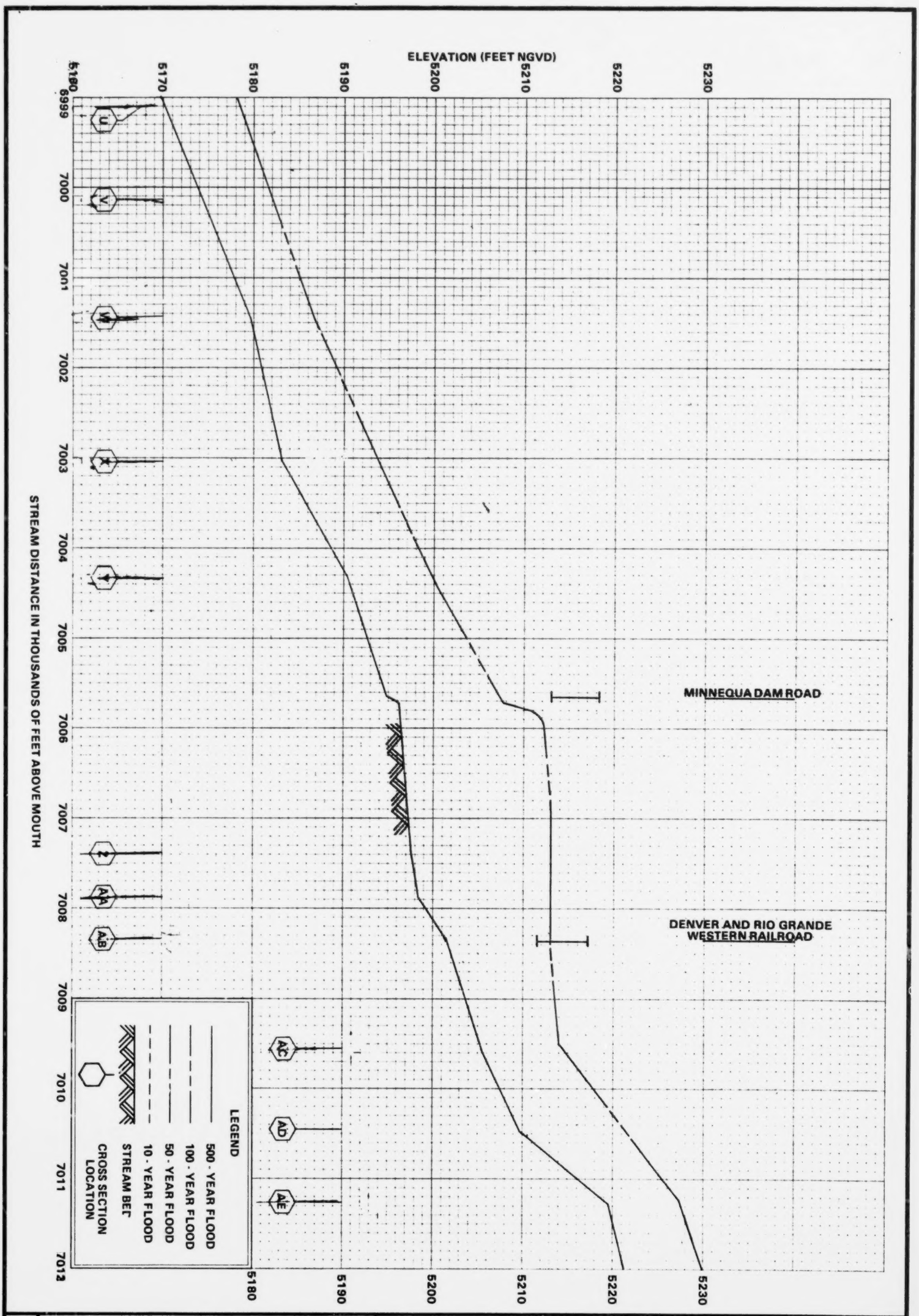
02P

FEDERAL EMERGENCY MANAGEMENT AGENCY

FREMONT COUNTY, CO
(UNINCORPORATED AREAS)

FLOOD PROFILES

ARKANSAS RIVER



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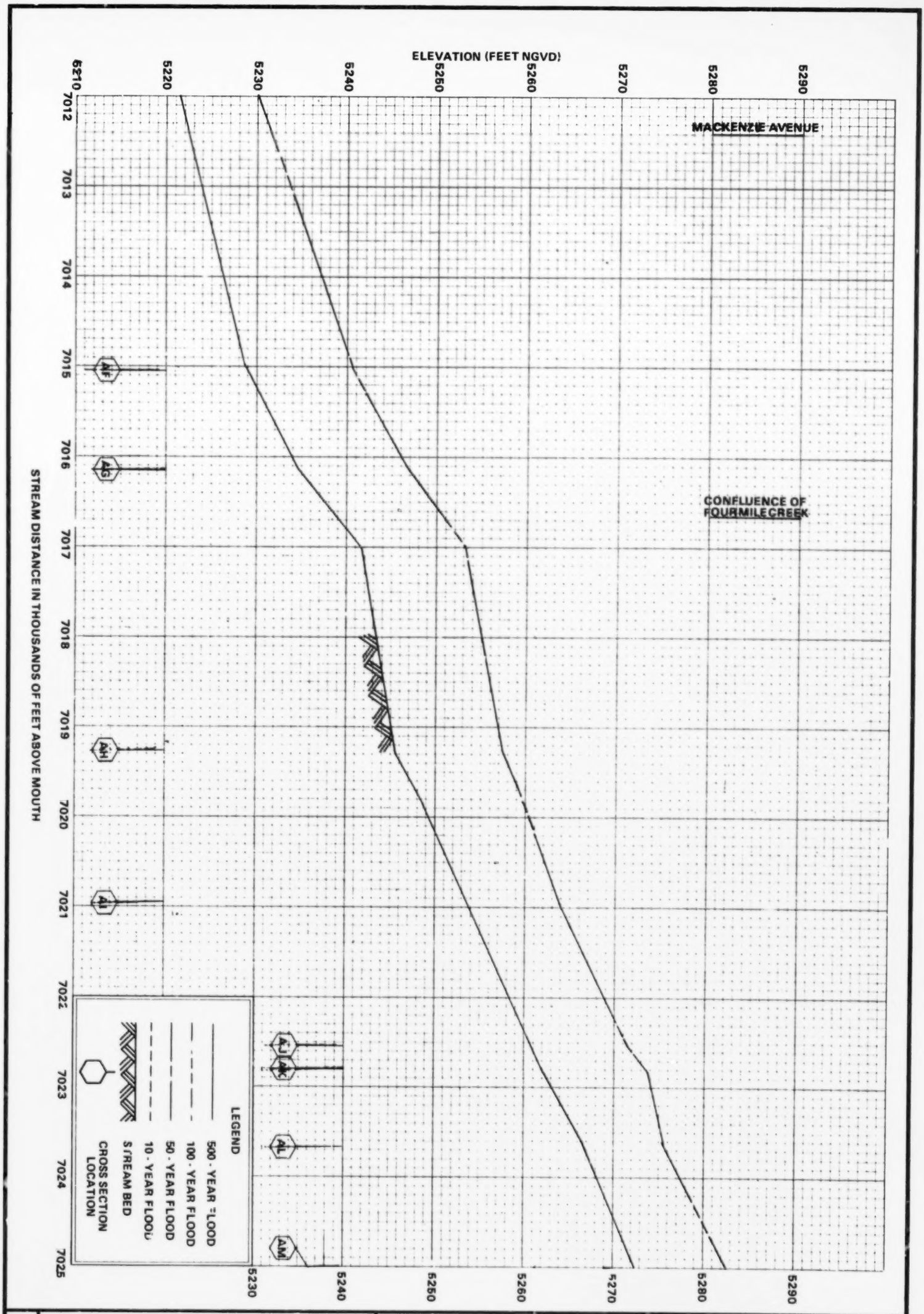
03P

FEDERAL EMERGENCY MANAGEMENT AGENCY

FREMONT COUNTY, CO
(UNINCORPORATED AREAS)

FLOOD PROFILES

ARKANSAS RIVER



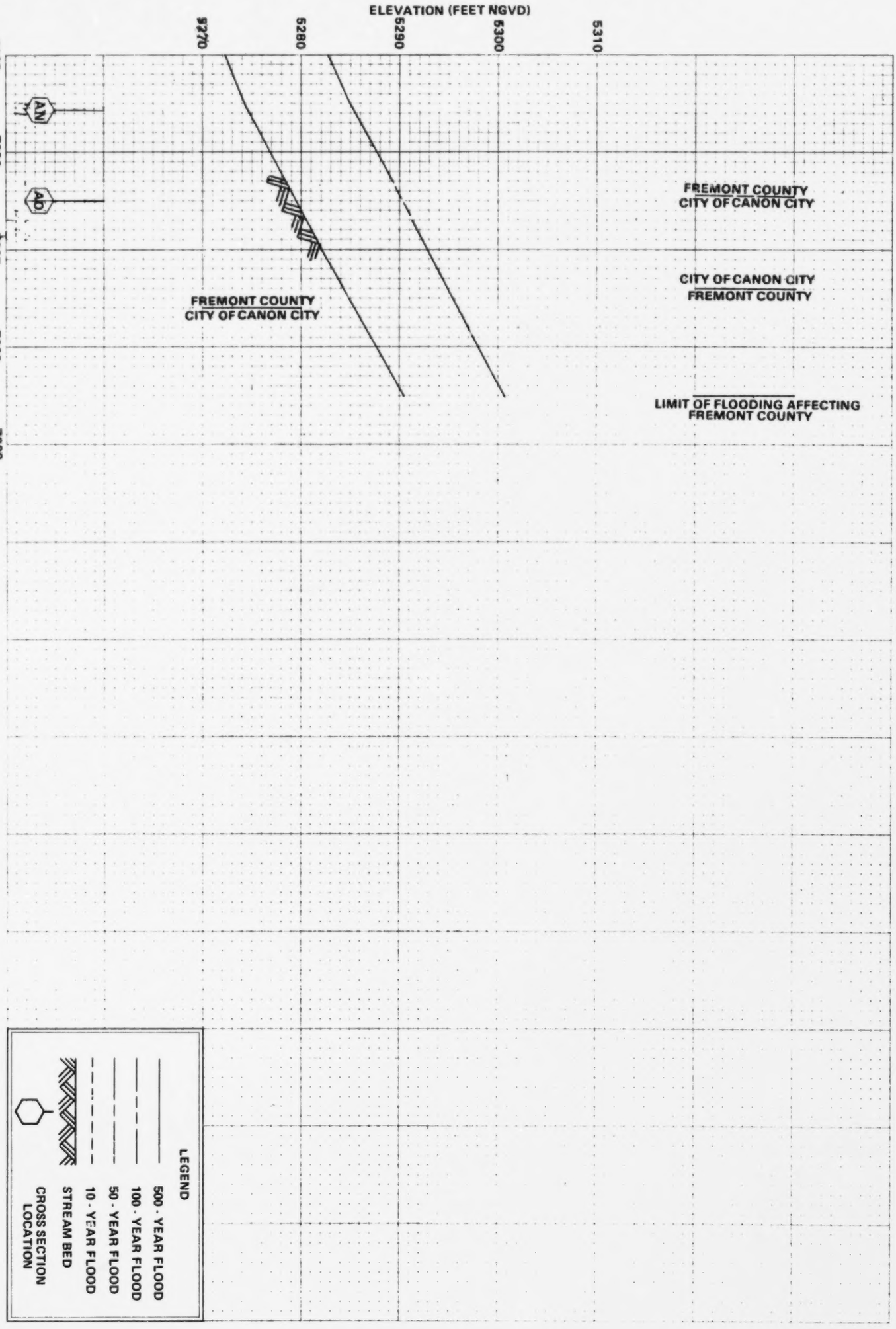
84P

FEDERAL EMERGENCY MANAGEMENT AGENCY

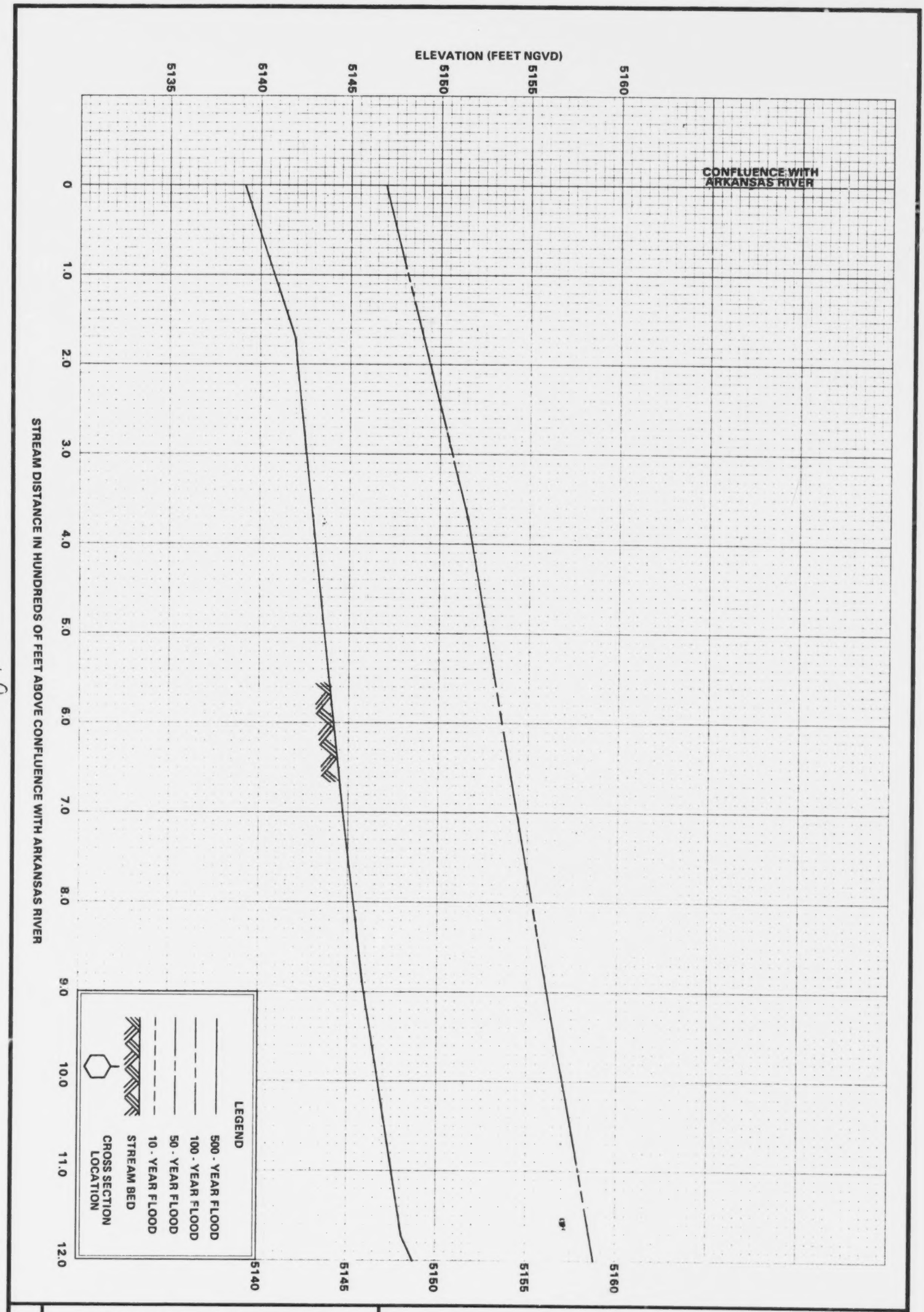
FREMONT COUNTY, CO
(UNINCORPORATED AREAS)

FLOOD PROFILES

ARKANSAS RIVER

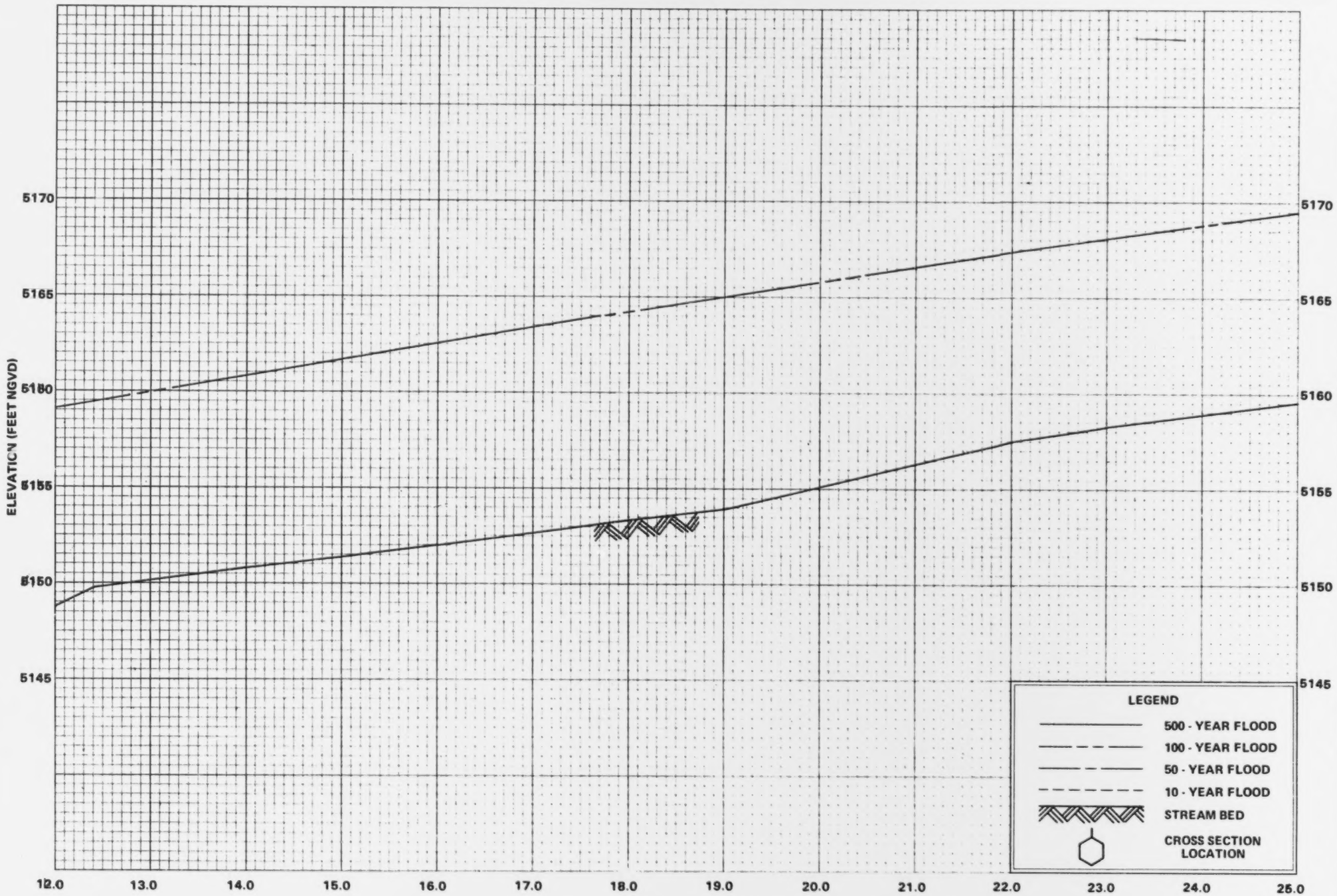


05P	FEDERAL EMERGENCY MANAGEMENT AGENCY **FREMONT COUNTY, CO** (UNINCORPORATED AREAS)	**FLOOD PROFILES** **ARKANSAS RIVER**



19

06P	FEDERAL EMERGENCY MANAGEMENT AGENCY **FREMONT COUNTY, CO** (UNINCORPORATED AREAS)	**FLOOD PROFILES** **OAK CREEK**



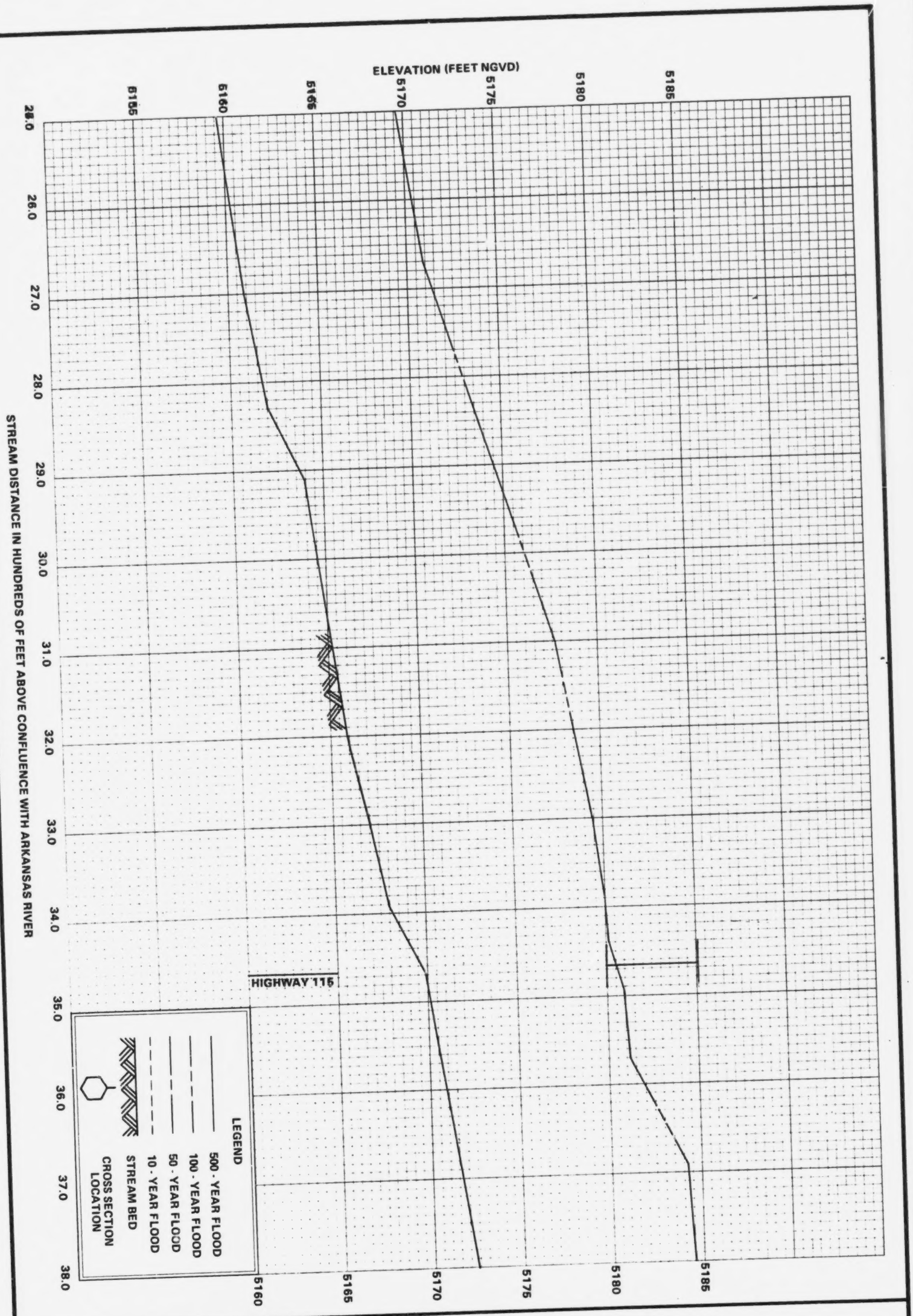
FLOOD PROFILES

OAK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

FREMONT COUNTY, CO
(UNINCORPORATED AREAS)

07P



FEDERAL EMERGENCY MANAGEMENT AGENCY

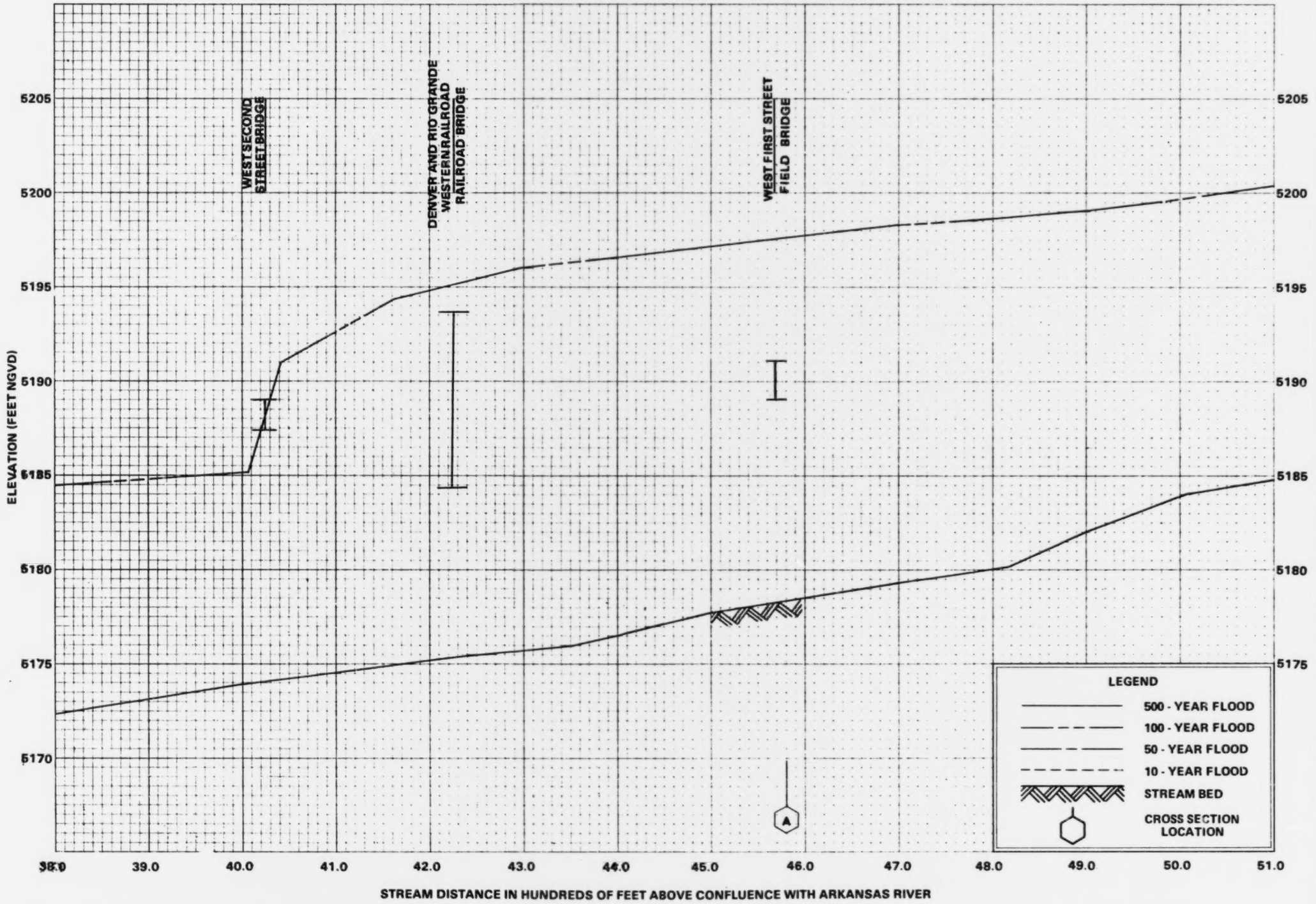
FREMONT COUNTY, CO
(UNINCORPORATED AREAS)

FLOOD PROFILES

OAK CREEK

08P

21



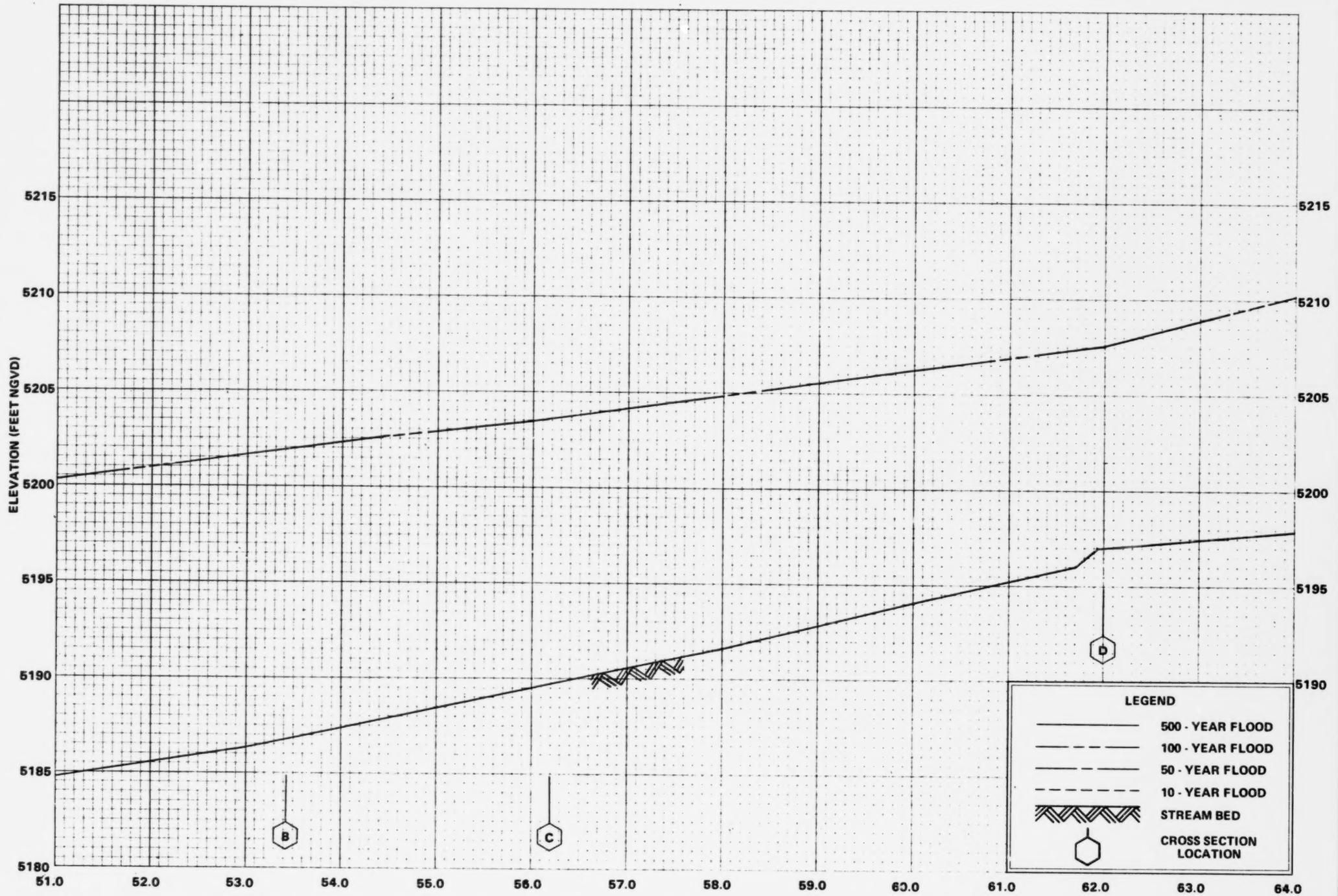
FLOOD PROFILES

OAK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

FREMONT COUNTY, CO
(UNINCORPORATED AREAS)

09P



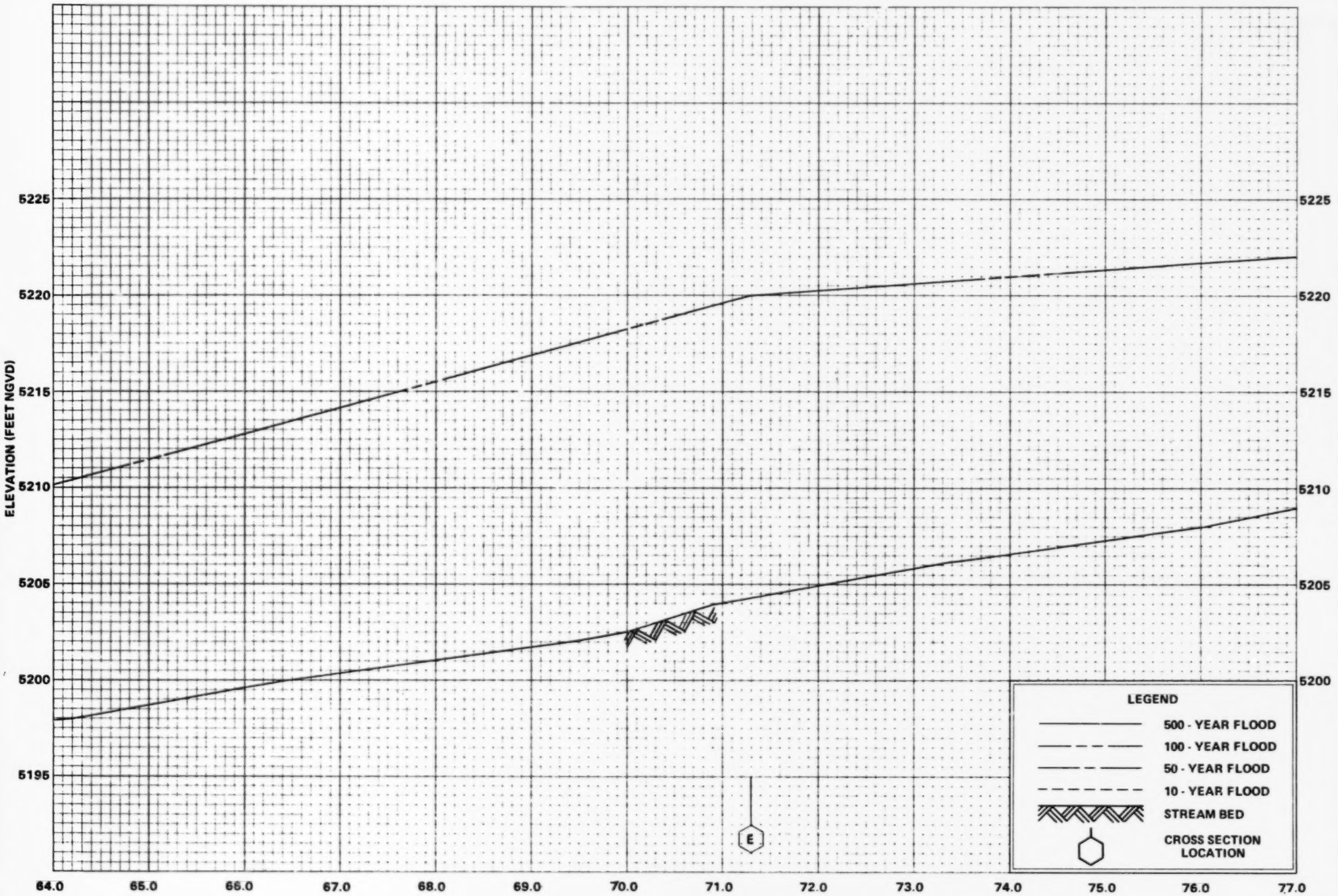
FLOOD PROFILES

OAK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

FREMONT COUNTY, CO
(UNINCORPORATED AREAS)

10P



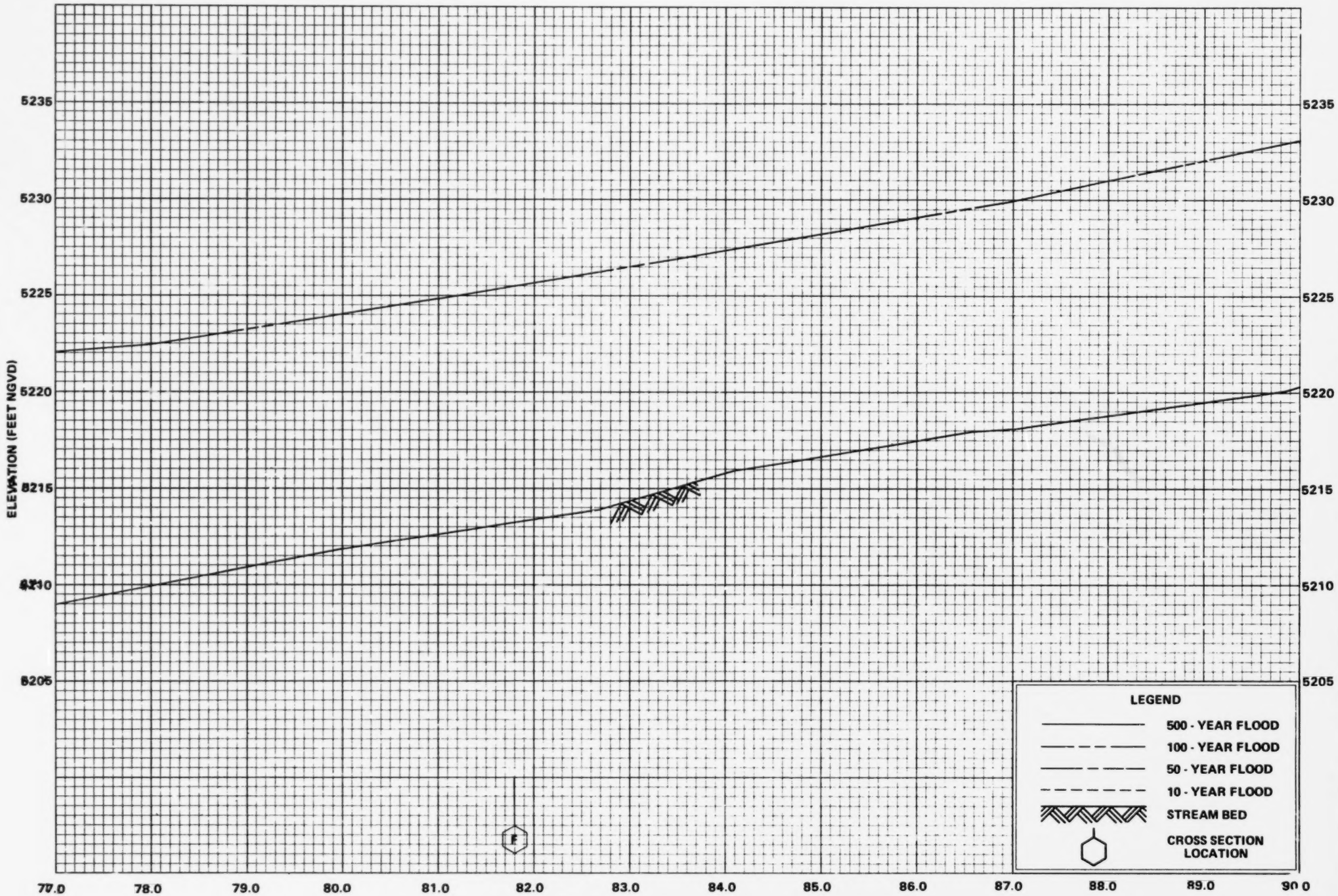
FLOOD PROFILES

OAK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

FREMONT COUNTY, CO
(UNINCORPORATED AREAS)

11P



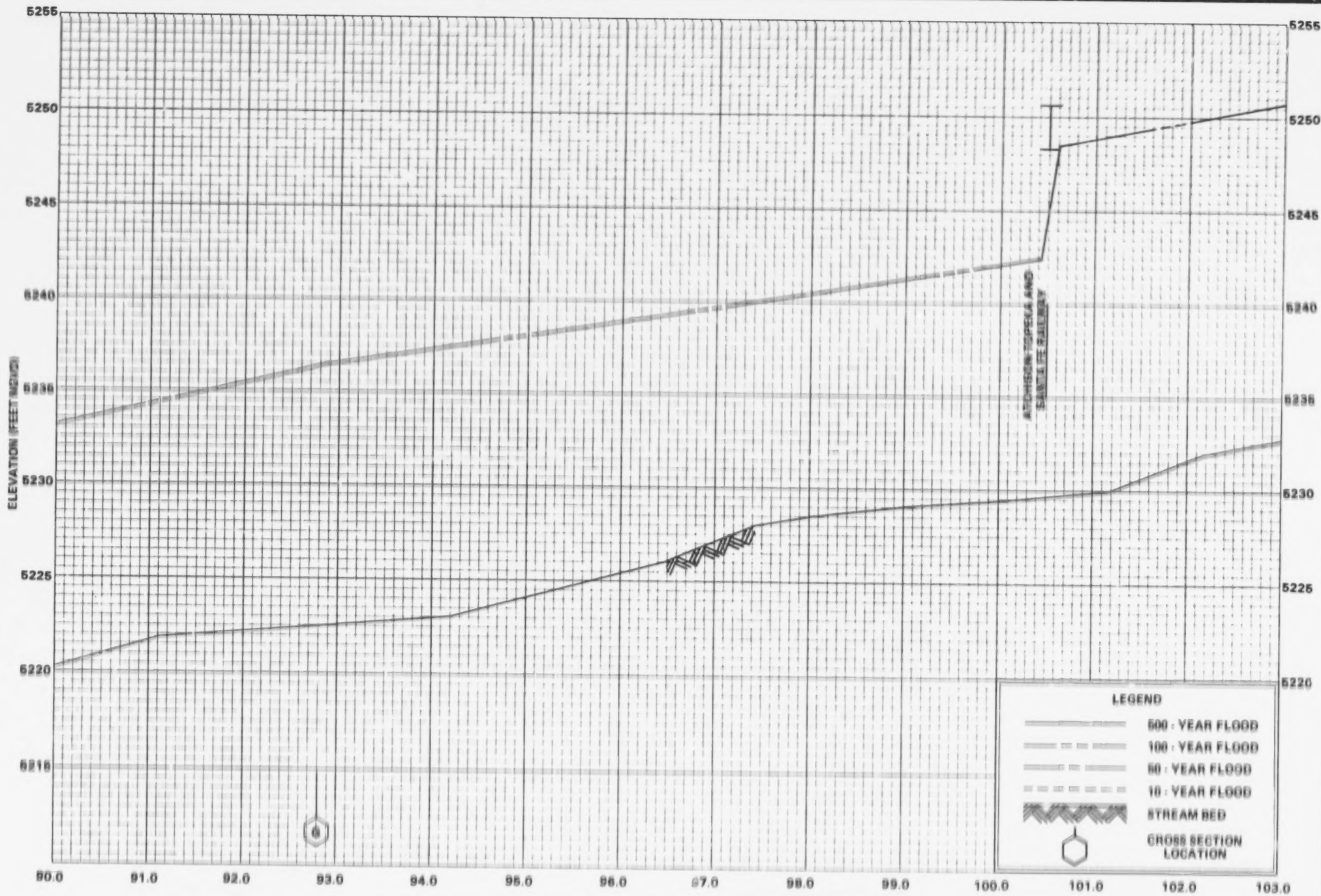
FLOOD PROFILES

OAK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

FREMONT COUNTY, CO
(UNINCORPORATED AREAS)

12P



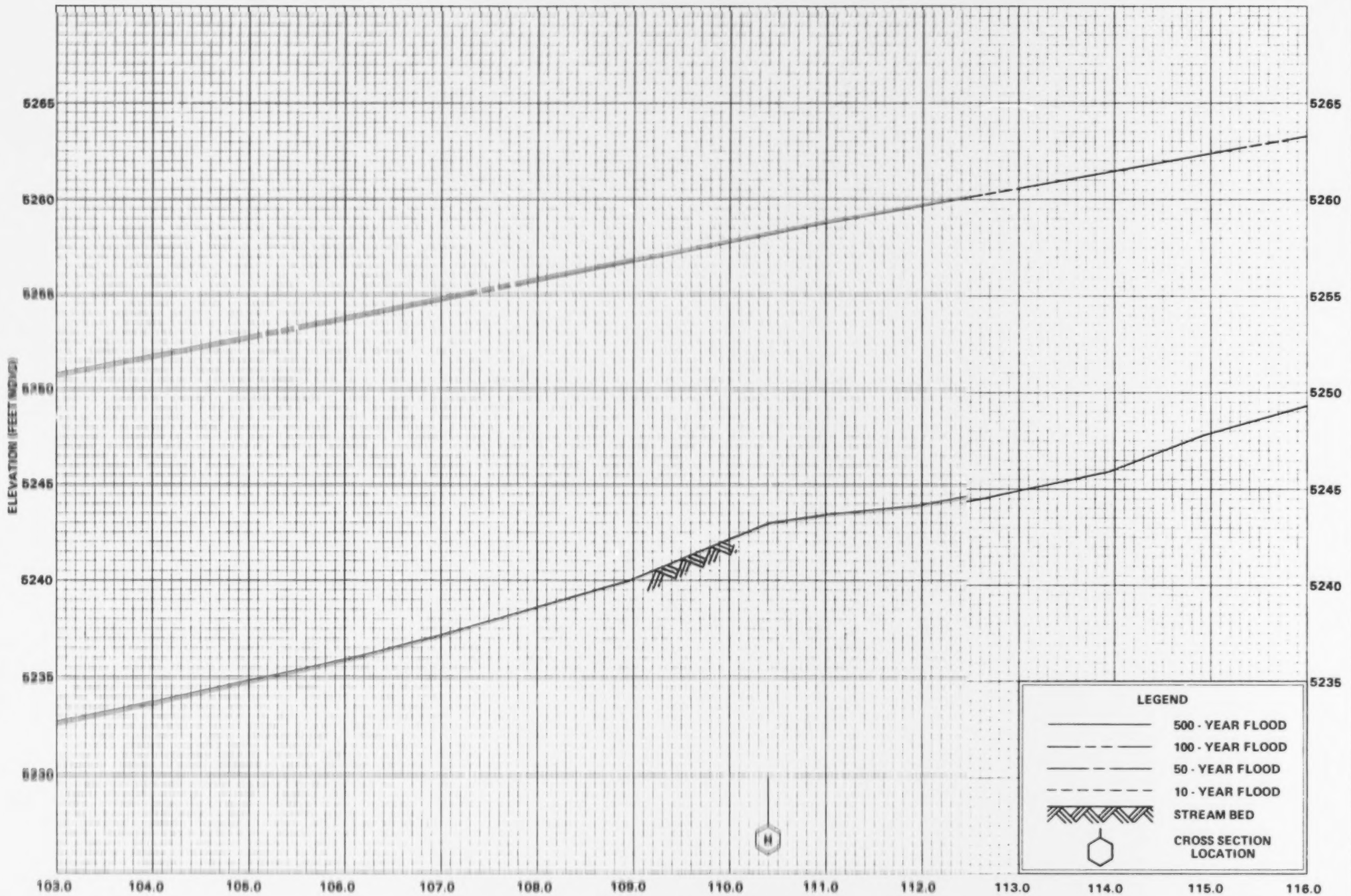
FLOOD PROFILES

OAK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

FREMONT COUNTY, CO
(UNINCORPORATED AREAS)

13P



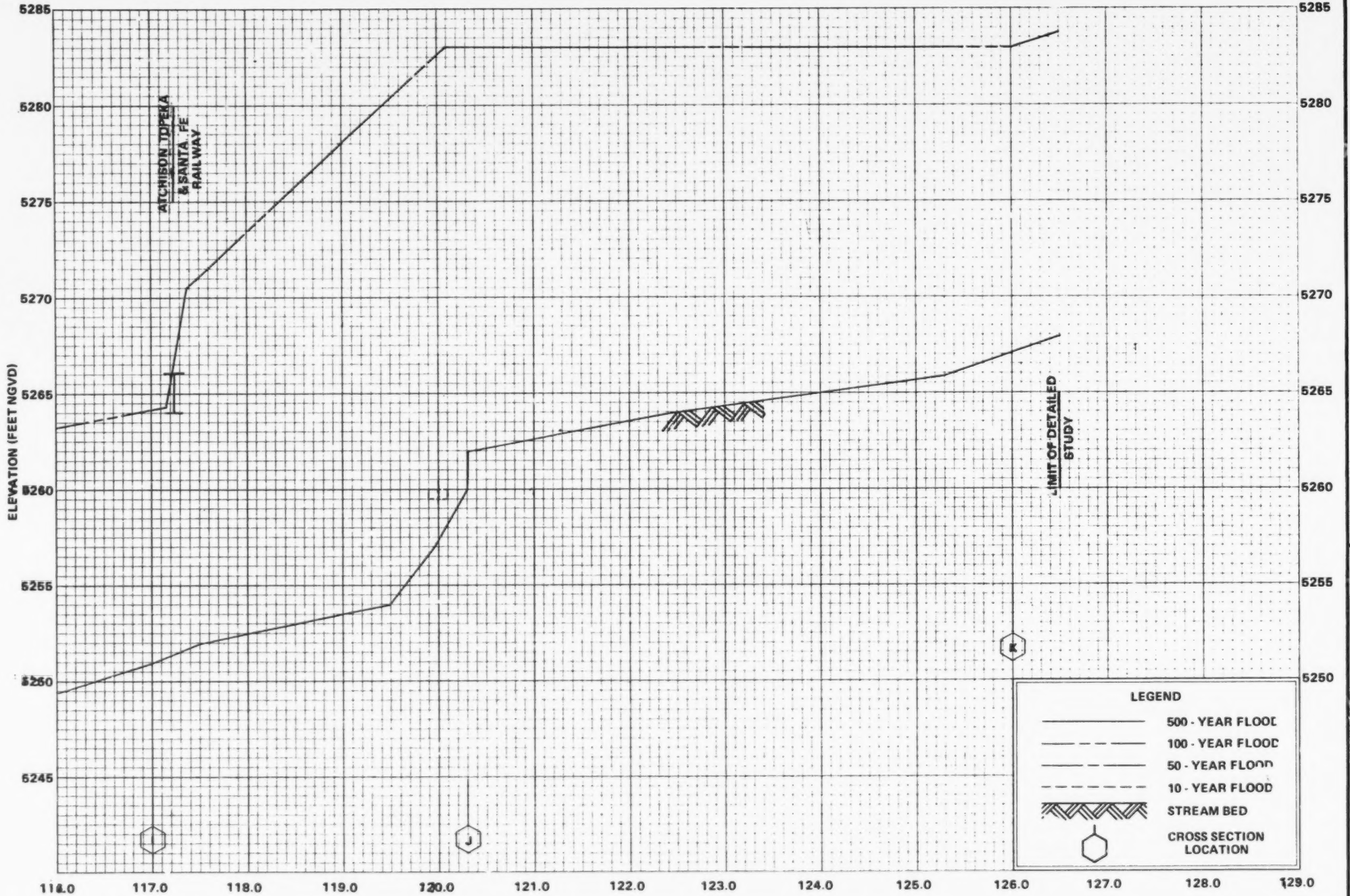
FLOOD PROFILES

OAK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

FREMONT COUNTY, CO
(UNINCORPORATED AREAS)

14P



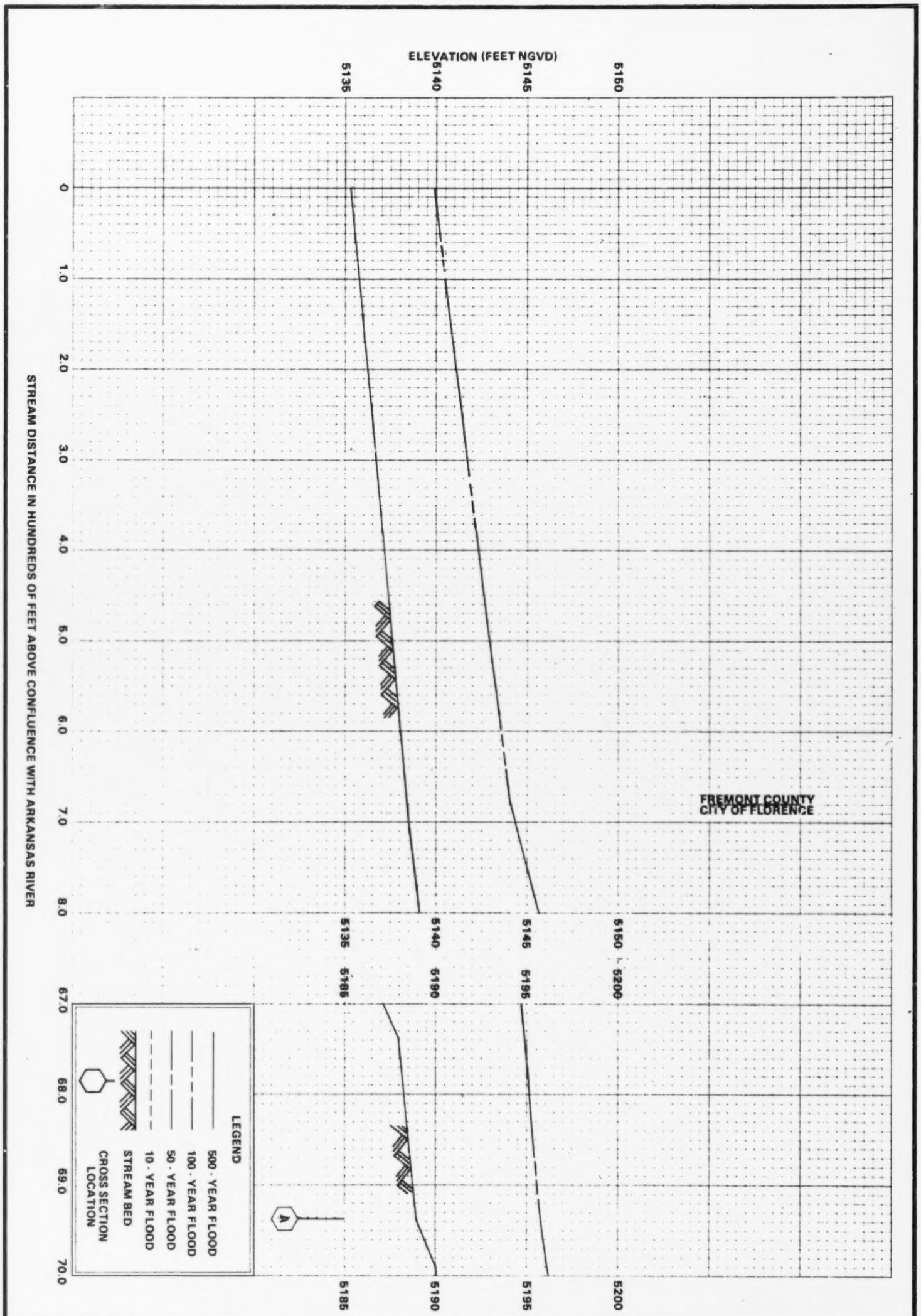
FLOOD PROFILES

OAK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

FREMONT COUNTY, CO
(UNINCORPORATED AREAS)

15P



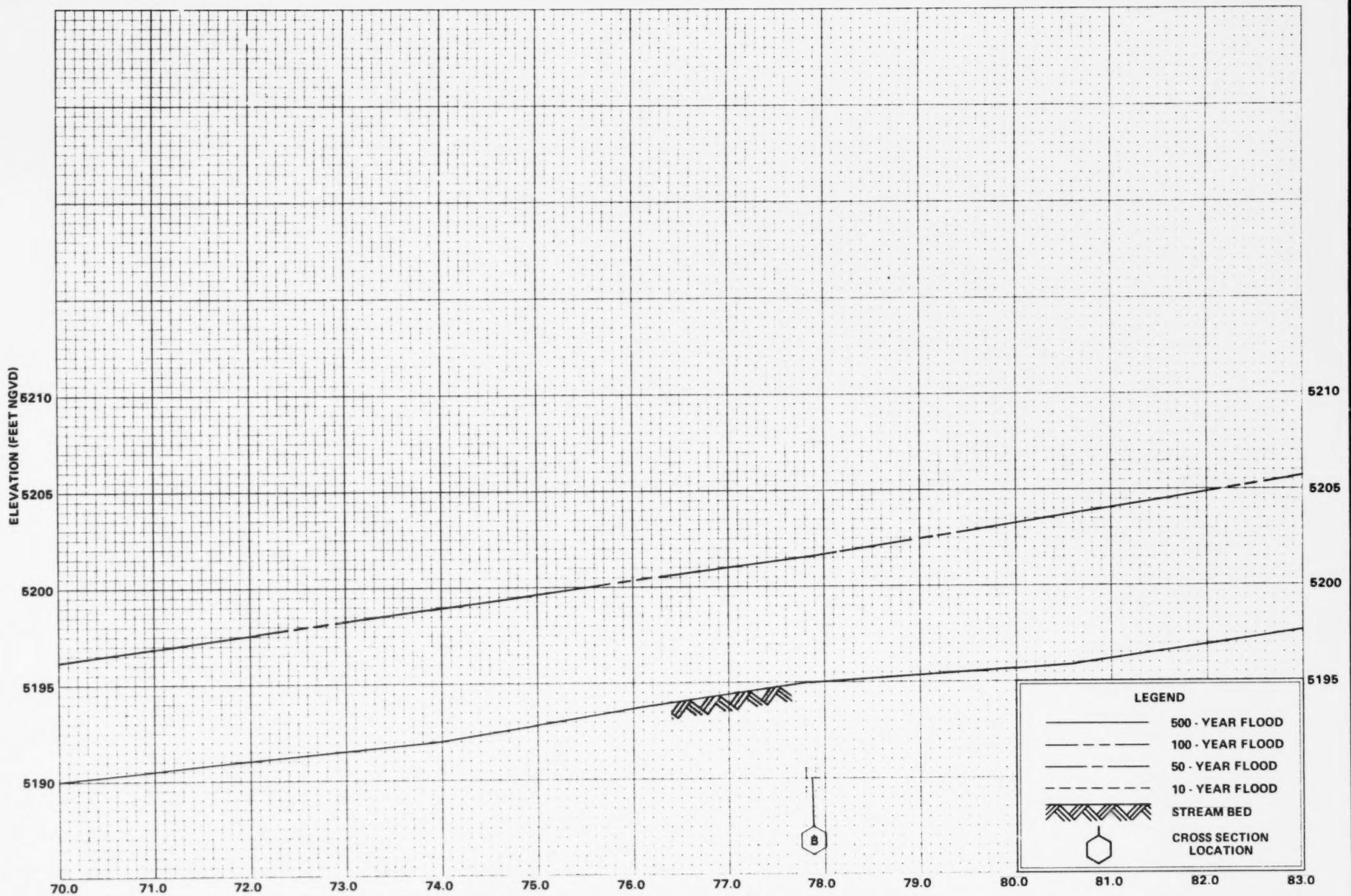
16P

FEDERAL EMERGENCY MANAGEMENT AGENCY

FREMONT COUNTY, CO
(UNINCORPORATED AREAS)

FLOOD PROFILES

COAL CREEK



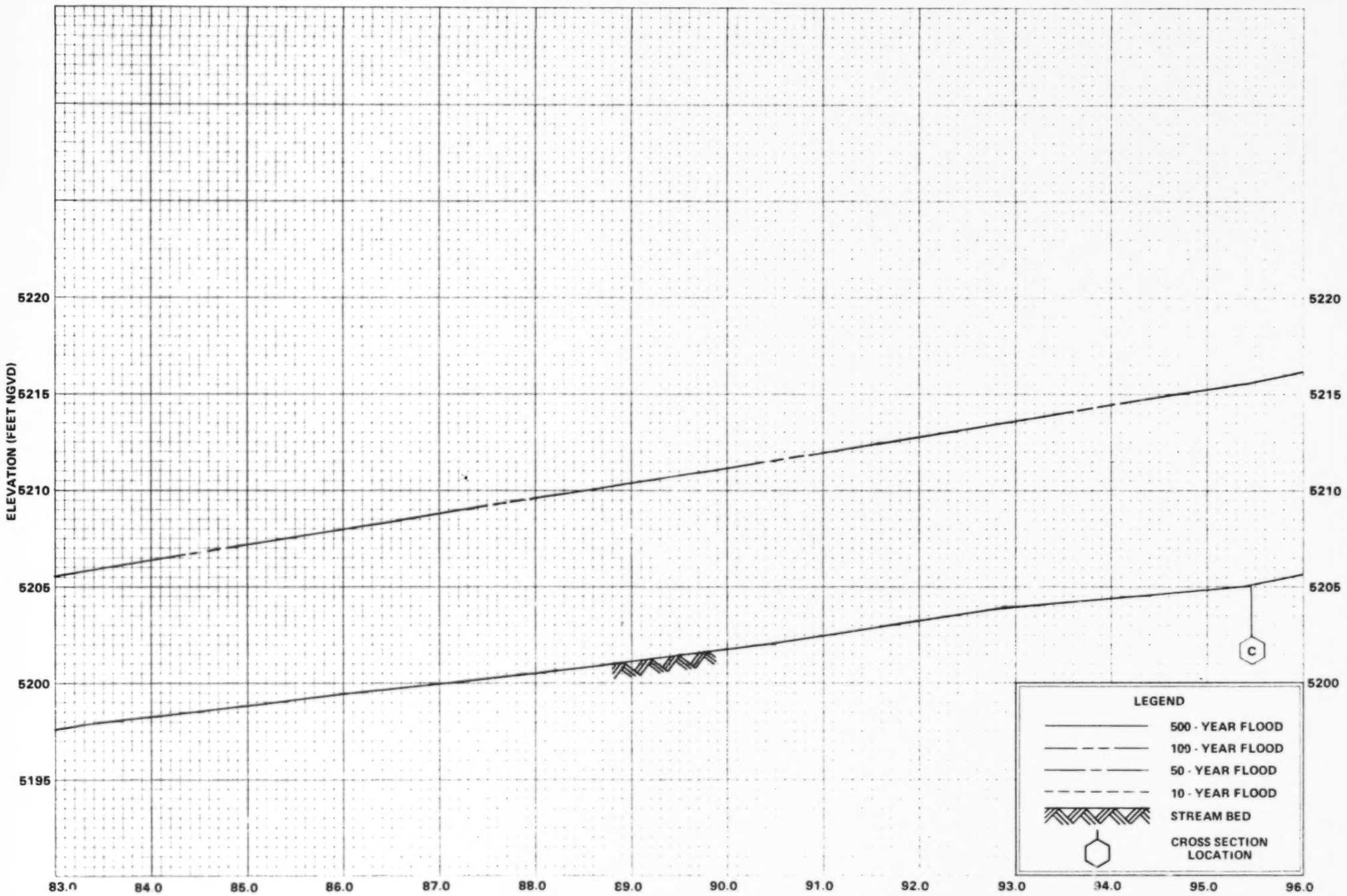
FLOOD PROFILES

COAL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

FREMONT COUNTY, CO
(UNINCORPORATED AREAS)

17P



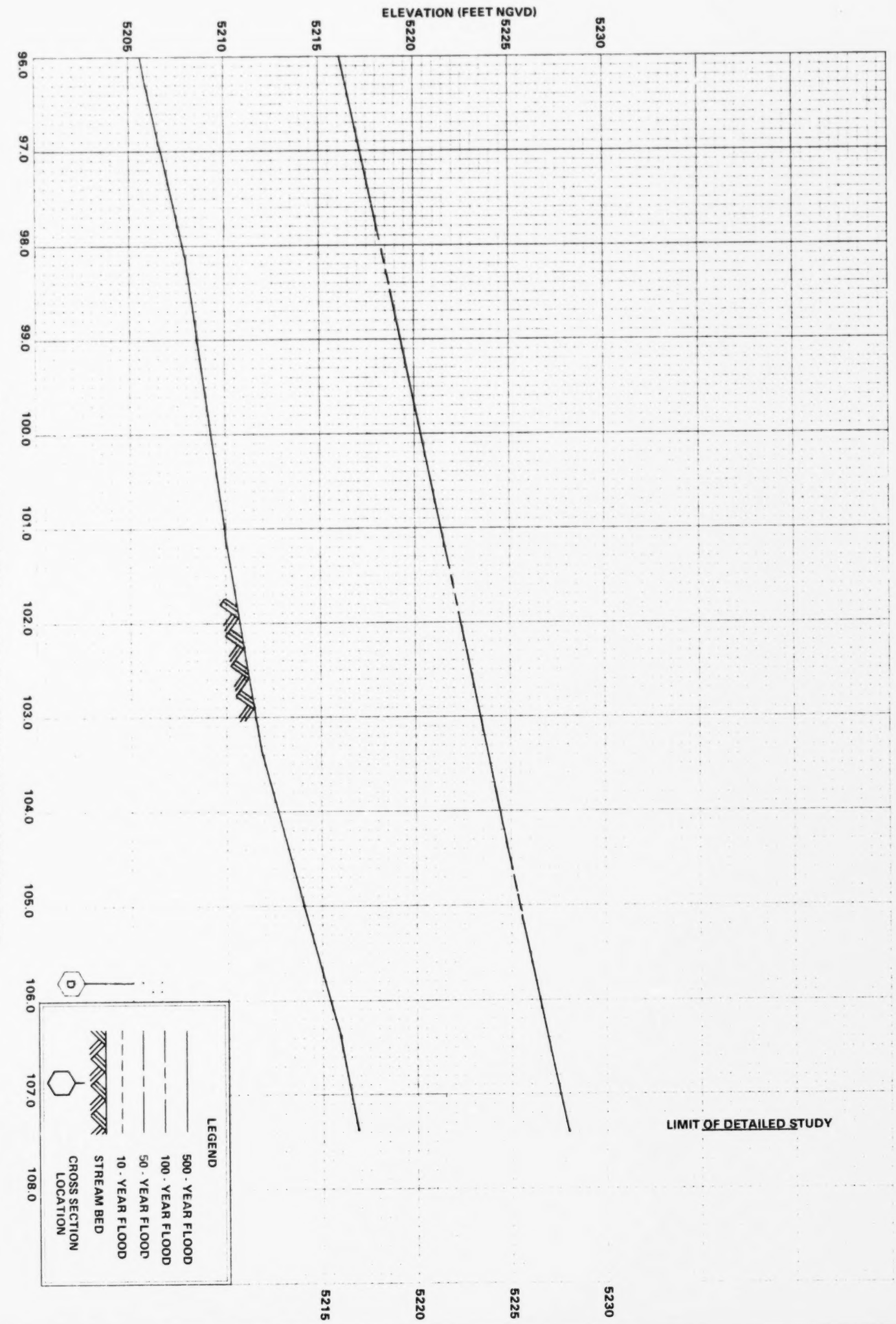
FLOOD PROFILES

COAL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

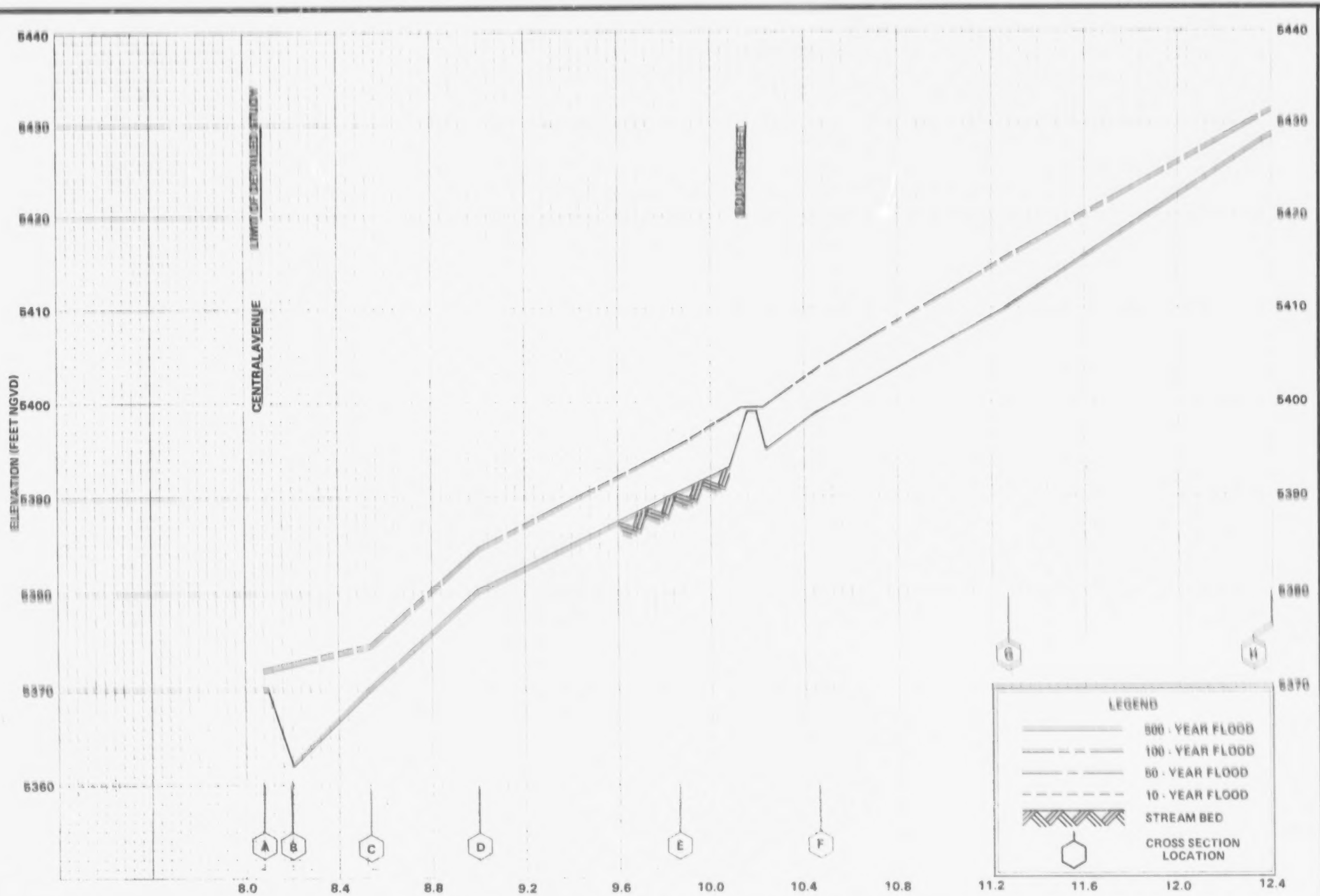
FREMONT COUNTY, CO
(UNINCORPORATED AREAS)

18P



32

19P	FEDERAL EMERGENCY MANAGEMENT AGENCY **FREMONT COUNTY, CO** (UNINCORPORATED AREAS)	**FLOOD PROFILES** **COAL CREEK**



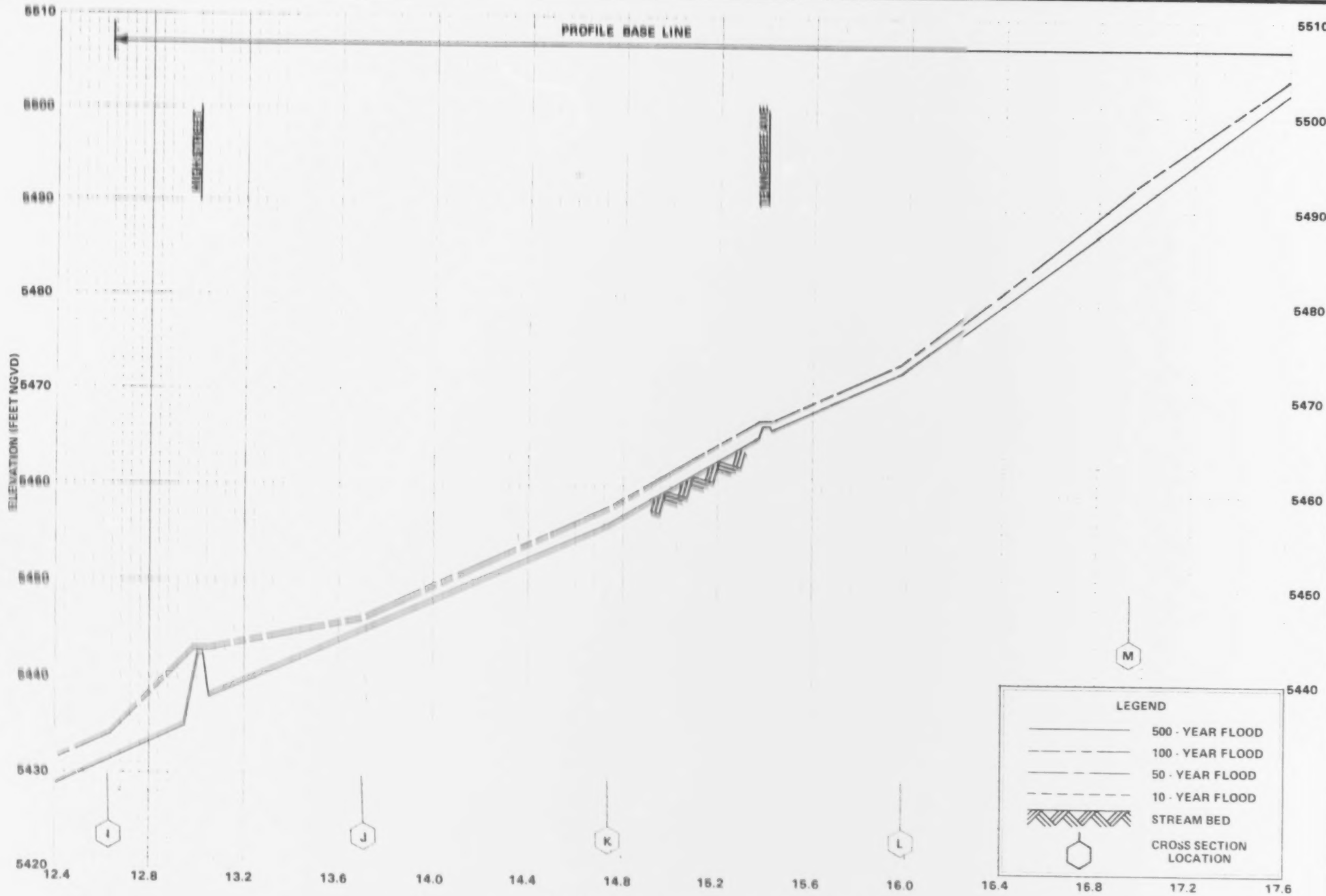
FLOOD PROFILES

NE CANON DRAINAGE AREA
(EAST BRANCH)

FEDERAL EMERGENCY MANAGEMENT AGENCY

FREMONT COUNTY, CO
(UNINCORPORATED AREAS)

20P



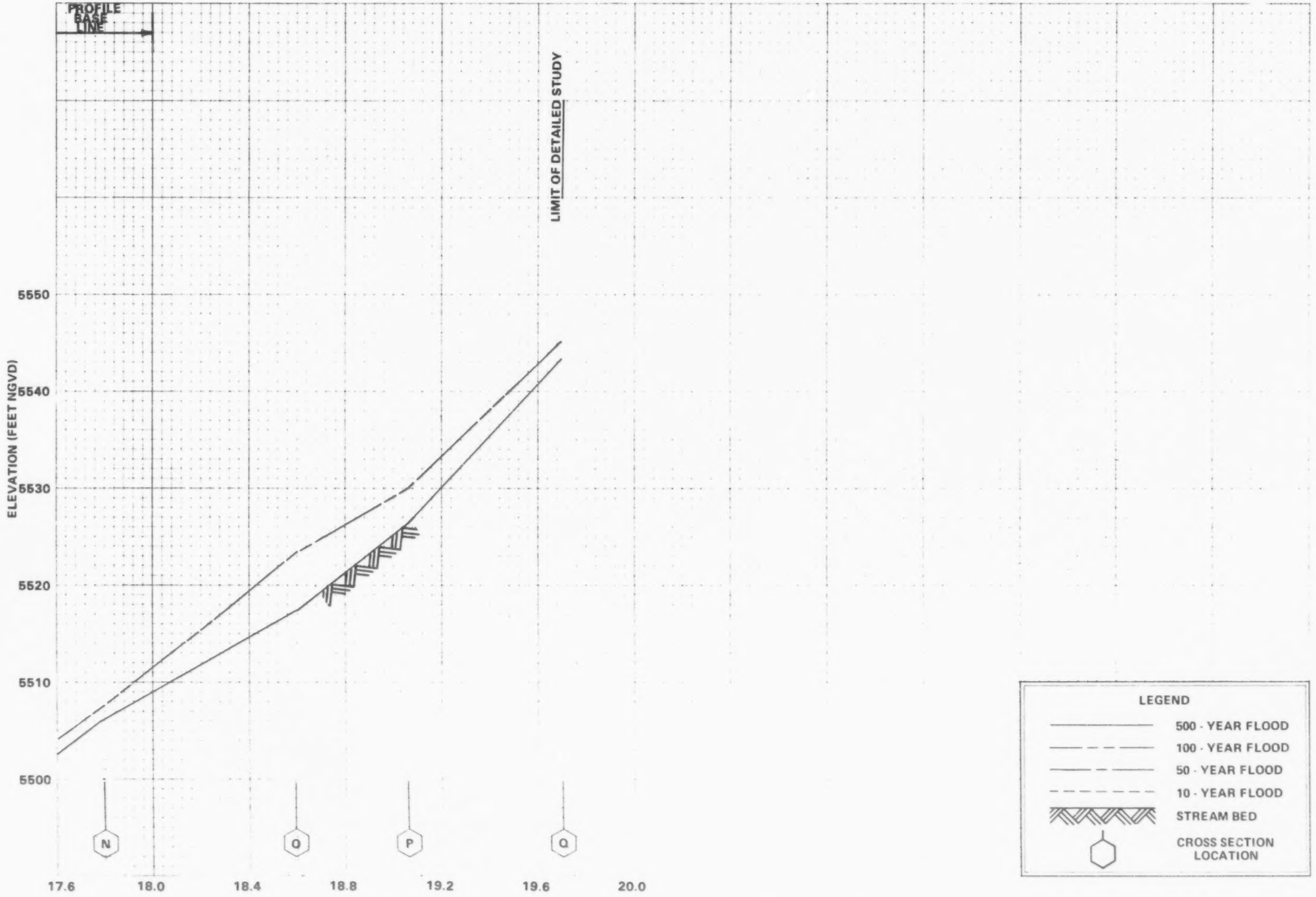
FLOOD PROFILES

NE CANON DRAINAGE AREA
(EAST BRANCH)

FEDERAL EMERGENCY MANAGEMENT AGENCY

FREMONT COUNTY, CO
(UNINCORPORATED AREAS)

21P



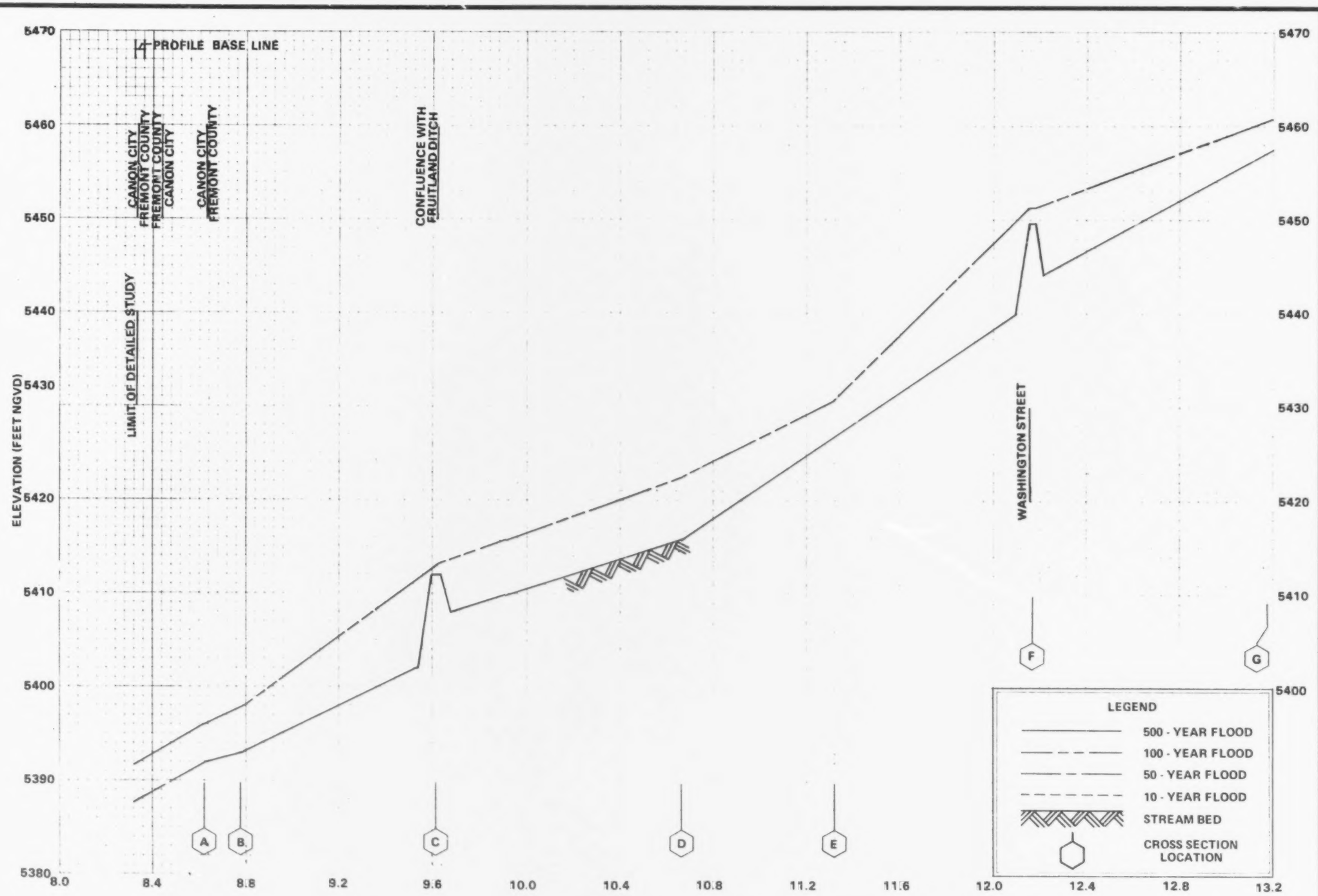
FLOOD PROFILES

NE CANON DRAINAGE AREA
(EAST BRANCH)

FEDERAL EMERGENCY MANAGEMENT AGENCY

FREMONT COUNTY, CO
(UNINCORPORATED AREAS)

22P



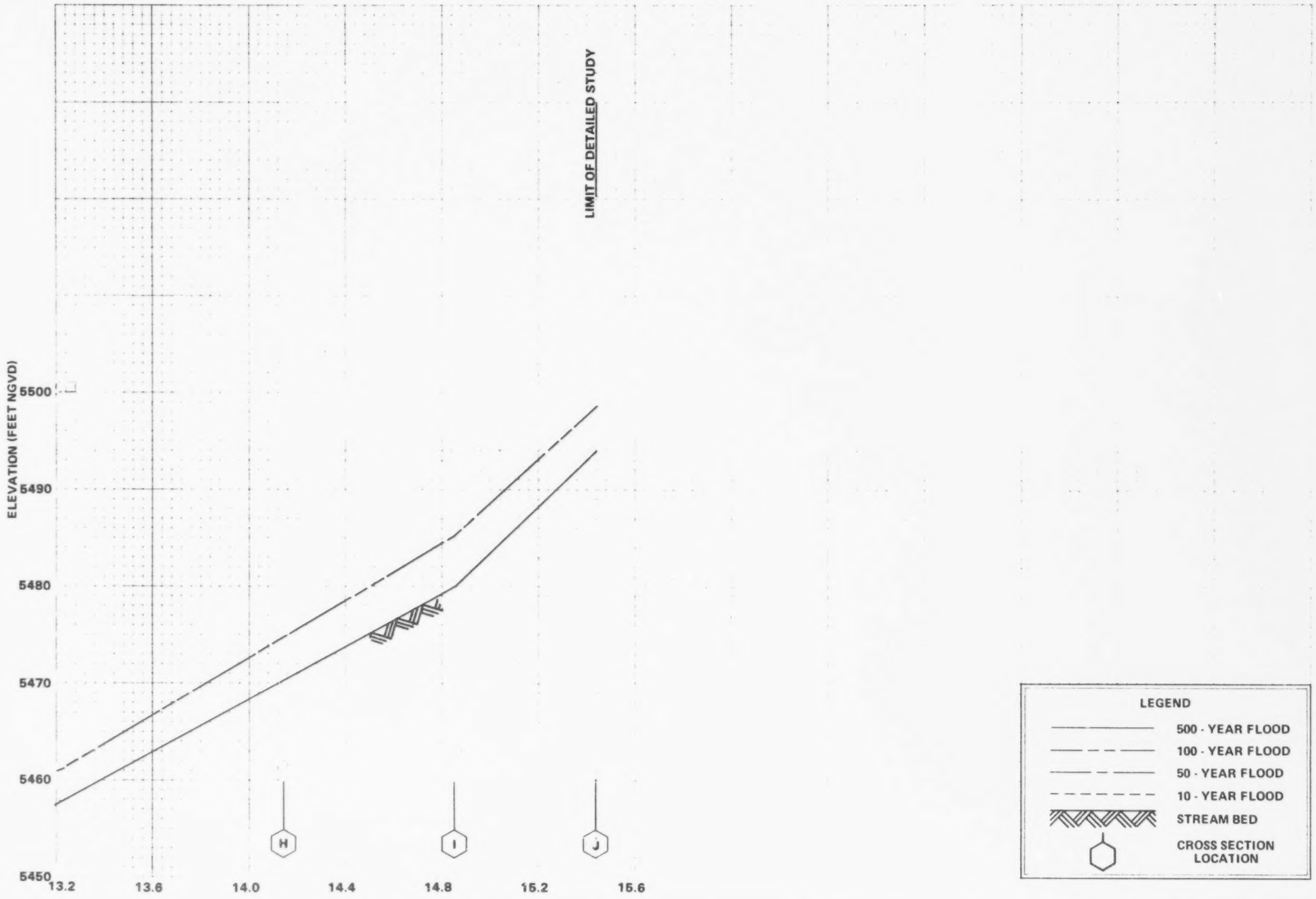
FLOOD PROFILES

NE CANON DRAINAGE AREA
(WEST BRANCH)

FEDERAL EMERGENCY MANAGEMENT AGENCY

FREMONT COUNTY, CO
(UNINCORPORATED AREAS)

23P



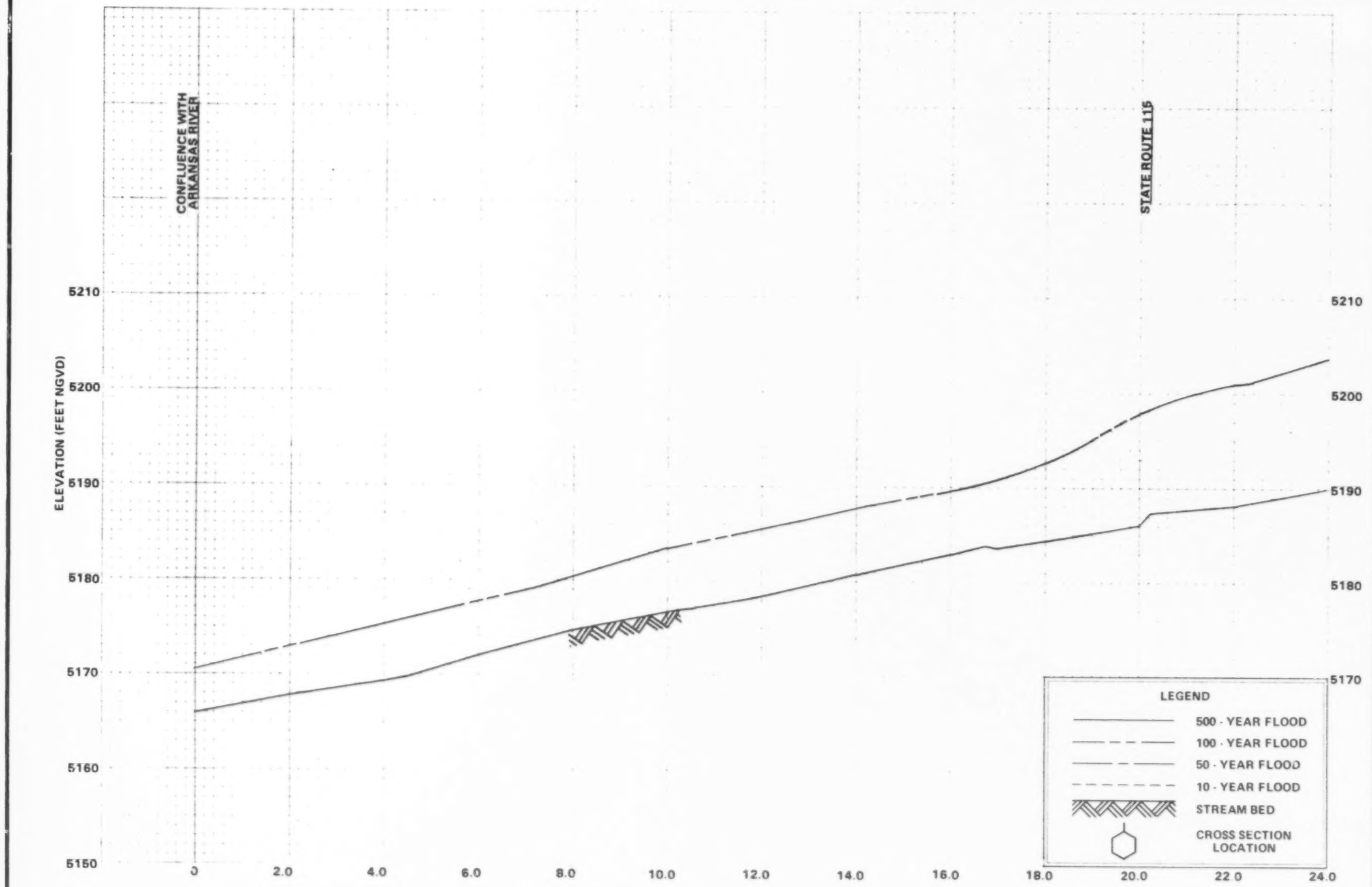
FLOOD PROFILES

NE CANON DRAINAGE AREA
(WEST BRANCH)

FEDERAL EMERGENCY MANAGEMENT AGENCY

FREMONT COUNTY, CO
(UNINCORPORATED AREAS)

24P



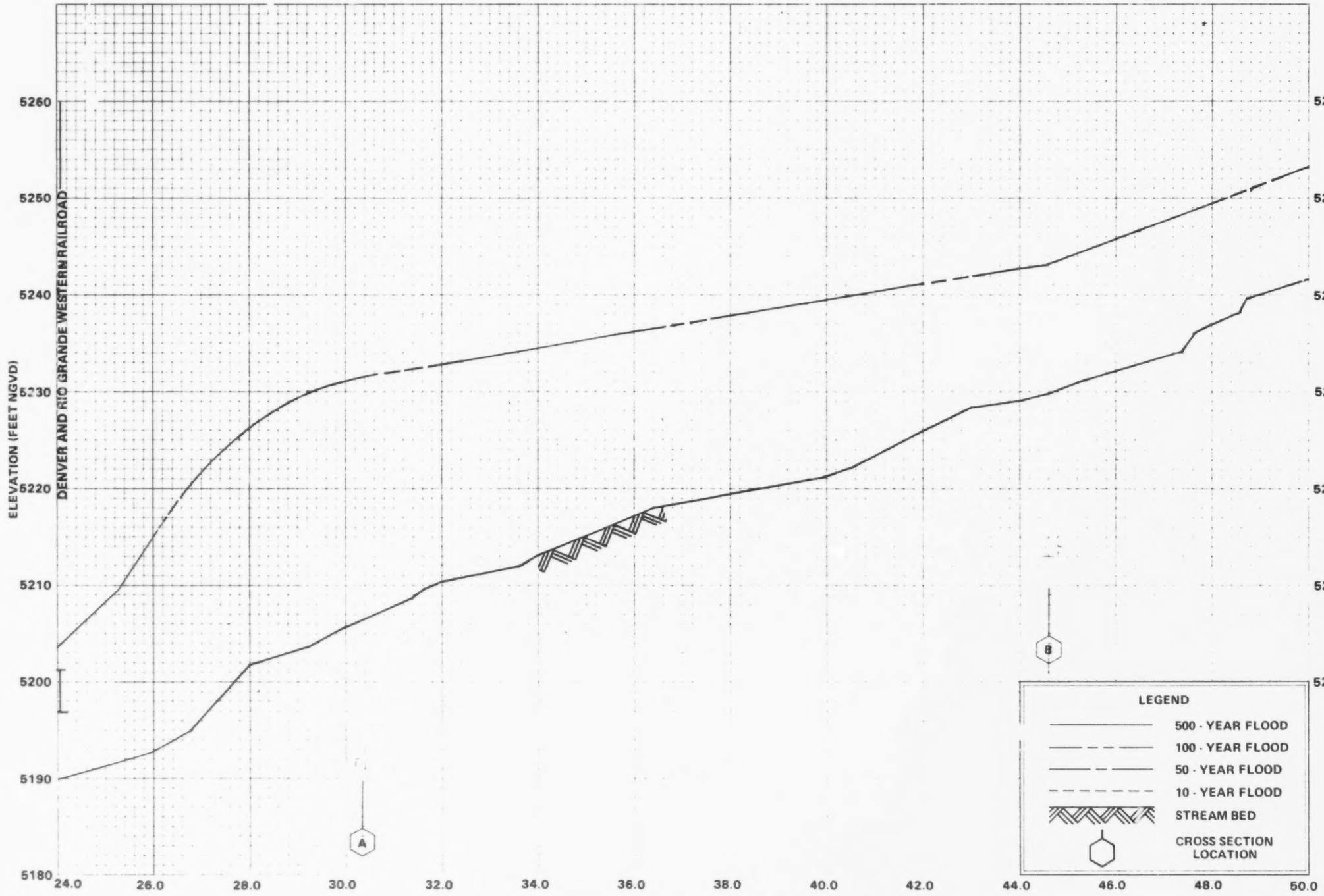
FLOOD PROFILES

CHANDLER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

FREMONT COUNTY, CO
(UNINCORPORATED AREAS)

25P



FLOOD PROFILES

CHANDLER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

FREMONT COUNTY, CO
(UNINCORPORATED AREAS)

26P

FLOOD PROFILES

CHANDLER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

FREMONT COUNTY, CO
(UNINCORPORATED AREAS)

27P

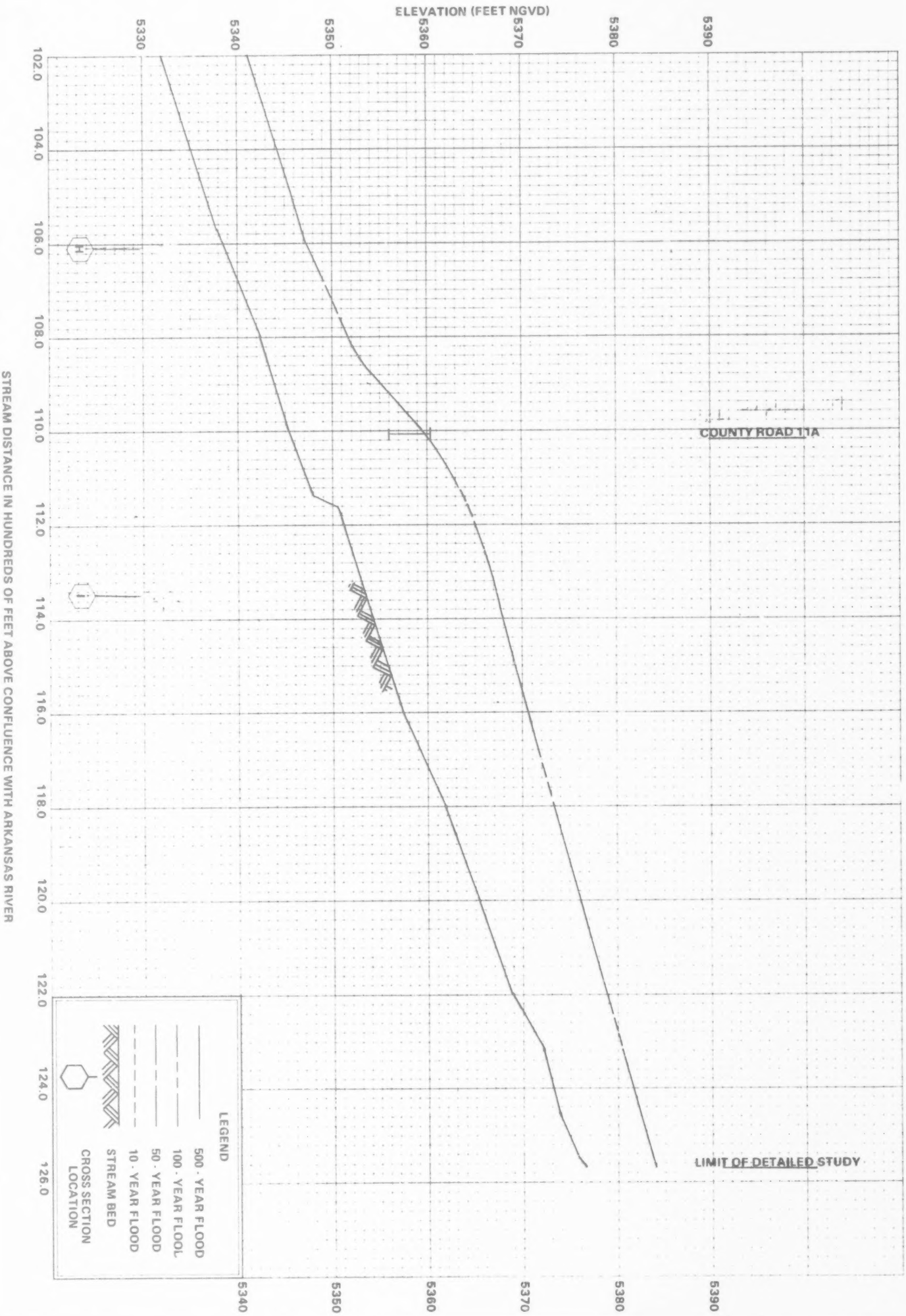
FLOOD PROFILES

CHANDLER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

FREMONT COUNTY, CO
(UNINCORPORATED AREAS)

28P



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29P	FEDFRAL FMERGENCY MANAGEMENT AGENCY FREMONT COUNTY, CO (UNINCORPORATED AREAS)	FLOOD PROFILES CHANDLER CREEK

EXHIBIT 3 - ELEVATION REFERENCE MARKS
FREMONT COUNTY, COLORADO (UNINCORPORATED AREAS)

Reference Mark	Elevation (feet NGVD)	Description of Location
RM 1	5229.45	Section 1, T19S, R69W; along D&RGW Railroad, 0.5 mile southeast of crossing of State Highway 267, 3.15 feet southwest of the southwest rail, 2.5 feet southwest of a fence, 2.5 feet above the top of the rails, set in the top of a sloping 8 foot by 12 foot granite boulder. Stamping: Y 7 1925.
RM 2	5331.79	Section 33, T18S, R70W; 3.5 feet northeast of the south corner of the D&RGW Railroad, 36.7 feet southwest of the southwest side of the southeast entrance to the freight office, set in the top of the northwest edge of the sidewalk. Stamping: V 6 1925.
RM 3	5237.36	Section 32, T18S, R70W; along the D&RGW Railroad at the 4th Street viaduct, 71.5 feet southeast of the southeast rail of the main track, 38 yards northwest of the northwest rail of the main track of the AT&SF Railroad, set vertically in the northwest side of the second concrete piling southeast of the track on the northeast row of piles of the viaduct 2.4 feet above ground. Stamping: R 341 1957.
RM 4	5357.25	Section 32, T18S, R70W; along the D&RGW Railroad at steel bridge 161.20, 6.2 feet north of the north rail, set in the top of the north end of the east concrete abutment of the bridge. Stamping: P 341 1933.